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PRECISION OF THE DETERMINATION OF FOCAL DEPTH FROM THE SPECTRAL RATIO OF LOVE/RAYLEIGH SURFACE WAVES

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ABSTRACT

The precision with which the focal depth may be determined using Love/Rayleigh-wave spectral ratios depends on the accuracy of the models for Earth structure and for source mechanism used in the focal depth calculations. Estimates of the precision of the focal depth determination are obtained using the partial derivatives of Love/Rayleigh spectral ratios with respect to the parameters: focal depth, shear velocity, dip angle, and slip angle. We find that errors caused by imprecise knowledge of any of these parameters can be important in practice.

INTRODUCTION

Accurate determination of focal depth from body-wave information is usually not possible for shallow-focus earthquakes because of the difficulty in identifying depth phases such as *pP*. Recently, the problem of determining the focal depth of an earthquake has been approached using surface-wave information such as spectra and spectral ratios (Keilis-Borok and Yanovskaya, 1962; Tsai, 1969; Harkrider, 1970; Tsai and Aki, 1970a, 1970b, 1970c; and Canitez and Toksöz, 1971). Surface-wave spectra are functions not only of the focal depth, but also of the earthquake source mechanism and the physical parameters of the Earth. Therefore, the source parameters and the Earth model must be derived from other information before the focal depth can be estimated using surface-wave spectra. The purpose of the present study is to determine how sensitive the ratio of Love- to Rayleigh-wave spectral amplitudes is to changes in the source depth, in the shear velocity within the Earth near the source, and in the source orientation. The accuracy of the focal depth determined from surface-wave spectral ratios may then be specified in terms of the accuracy of the source mechanism and of the Earth model.

The theory is now available for the calculation of the far-field displacement associated with the propagation of surface waves generated by mathematical representations of earthquake source models within realistic Earth structures. The theory for calculating surface-wave dispersion in a multilayered medium was developed initially by Haskell (1953), and was expanded by the work of Harkrider and Anderson (1962), Rosenbaum (1964), Thrower (1965), Dunkin (1965) and Saito (1967). Mathematical representations of source models for earthquakes were derived through the work of Yanovskaya (1958), Knopoff and Gilbert (1960), Ben-Menahem (1961), Maruyama (1963), Haskell (1963, 1964), Burridge and Knopoff (1964) and Haskell (1966). The relations yielding the far-field surface-wave displacements resulting from source models located in specified realistic Earth structures were presented by Harkrider (1964) and Ben-Menahem and Harkrider (1964), and have been expanded upon in the work of Harkrider and Anderson (1966), Saito (1967), and Harkrider (1970). Using the theory developed in these studies, spectral ratios of surface waves are determined in the present study for a series of source mechanisms, focal depths, and Earth structures. An estimate is then made of the precision of focal depth determinations from surface-wave spectral ratios.

Theory

Using the notation of Harkrider (1970), the far-field expressions for Rayleigh- and Love-wave spectral amplitudes may be written

$$U_R = Sk_R{}^m e^{-i(1+2m)\pi/4}\chi_R(\theta, h)E_R \frac{e^{-ik_R r}}{r^{1/2}} e^{-\gamma_R r}$$

$$U_L = Sk_L{}^m e^{-i(1+2m)\pi/4}\chi_L(\theta, h)E_L \frac{e^{-ik_L r}}{r^{1/2}} e^{-\gamma_L r} \tag{1}$$

where S is the spectral source function, $m = 0$ for a point force source and $m = 1$ for a couple of double-couple source, $k_R = \omega/C_R$ for Rayleigh waves, where C_R is the Rayleigh-wave phase velocity, $k_L = \omega/C_L$ for Love waves, where C_L is the Love-wave phase velocity, h is the source depth, θ is the azimuth from source to station, r is the epicentral distance, and γ_R and γ_L are the Rayleigh and Love-wave attenuation coefficients, respectively. The terms E_R and E_L in equation (1) are given by

$$E_R = \varepsilon_0 A_R k_R{}^{-1/2}$$

$$E_L = A_L k_L{}^{-1/2} \tag{2}$$

where ε_0 is the Rayleigh-wave ellipticity

$$\varepsilon_0 = -[\dot{U}_0{}^*/\dot{W}_0{}^*] \tag{3}$$

and A_R and A_L are the Rayleigh and Love amplitude response caused by a vertical point force at the surface. The radiation pattern function $\chi(\theta, h)$ given in equation (1) is

$$\chi(\theta, h) = d_0 + i(d_1 \sin\theta + d_2 \cos\theta) + d_3 \sin 2\theta + d_4 \cos 2\theta \tag{4}$$

where the coefficients d_i are defined in Table I.

Using equations (1) and (2), the Love/Rayleigh amplitude ratio may be written

$$J = \left|\frac{U_L}{U_R}\right| = \left|\frac{k_L{}^m}{k_R{}^m}\frac{\chi_L}{\chi_R}\frac{A_L k_L{}^{-1/2}}{\varepsilon_0 A_R k_R{}^{-1/2}}\frac{e^{-\gamma_L r}}{e^{-\gamma_R r}}\right| \tag{5}$$

assuming the spectral source function S to be approximately the same for Rayleigh and Love waves.

To determine the sensitivity of the ratio Love/Rayleigh to focal depth h as compared to its sensitivity to changes in the shear velocity β of the Earth and in the dip angle δ and slip angle λ of the fault, the following ratios of partial derivatives may be computed

$$\mathrm{DR}\,(h, \beta) = \frac{\dfrac{\partial J}{\partial h}}{\dfrac{\partial J}{\partial \beta}}$$

$$\mathrm{DR}\,(h, \delta) = \frac{\dfrac{\partial J}{\partial h}}{\dfrac{\partial J}{\partial \delta}}$$

$$\mathrm{DR}\,(h, \lambda) = \frac{\dfrac{\partial J}{\partial h}}{\dfrac{\partial J}{\partial \lambda}}. \tag{6}$$

TABLE I

RADIATION PATTERN COEFFICIENTS*

Coefficient	Point force Love	Point force Rayleigh
d_0	0	$\sin\lambda \sin\delta W(h)$
d_1	$\cos\lambda V(h)$	$-\sin\lambda \cos\delta A(h)$
d_2	$-\sin\lambda \cos\delta V(h)$	$-\cos\lambda A(h)$
d_3	0	0
d_4	0	0

Coefficient	Couple Love	Couple Rayleigh
d_0	$-\frac{1}{2}\cos\lambda \sin\delta V(h)$	$\frac{1}{4}\sin\lambda \sin 2\delta B(h)$
d_1	$\cos\lambda \cos\delta C(h)$	$\sin\lambda(W(h)-\cos^2\delta C(h)]$
d_2	$-\sin\lambda \cos^2\delta G(h)$	$\cos\lambda \cos\delta(W(h)-C(h)]$
d_3	$\frac{1}{4}\sin\lambda \sin 2\delta V(h)$	$\frac{1}{2}\cos\lambda \sin\delta A(h)$
d_4	$\frac{1}{2}\cos\lambda \sin\delta V(h)$	$-\frac{1}{4}\sin\lambda \sin 2\delta A(h)$

Coefficient	Double-Couple Love	Double-Couple Rayleigh
d_0	0	$\frac{1}{2}\sin\lambda \sin 2\delta B(h)$
d_1	$\cos\lambda \cos\delta G(h)$	$-\sin\lambda \cos 2\delta C(h)$
d_2	$-\sin\lambda \cos 2\delta G(h)$	$-\cos\lambda \cos\delta C(h)$
d_3	$\frac{1}{2}\sin\lambda \sin 2\delta V(h)$	$\cos\lambda \sin\delta A(h)$
d_4	$\cos\lambda \sin\delta V(h)$	$-\frac{1}{2}\sin\lambda \sin 2\delta A(h)$

* The factors $W(h)$, $A(h)$, $C(h)$, $B(h)$, $V(h)$ and $G(h)$ in terms of the Thomson-Haskell displacement-stress vector elements (Haskell, 1953) are

$$W(h) = [\dot{w}_S(h)/\dot{w}_0]$$

$$A(h) = -[\dot{u}_S{}^*(h)/\dot{w}_0]$$

$$C(h) = -\frac{1}{\mu_S}[\tau_{RS}(h)/(\dot{w}_0/C_R)]$$

$$B(h) = -\left\{\left(3-4\frac{\beta_S{}^2}{\alpha_S{}^2}\right)[\dot{u}_s{}^*(h)/\dot{w}_0]+\frac{2}{\rho_S\alpha_S{}^2}[\sigma_{RS}{}^*(h)/(\dot{w}_0/C_R)]\right\}$$

$$V(h) = [\dot{v}_S(h)/\dot{v}_0]$$

and

$$G(h) = \frac{1}{\mu_S}[\tau_{LS}{}^*(h)/(\dot{v}_0/C_L)].$$

From equations (5) and (6), we have

$$\mathrm{DR}\,(h,\beta) = \frac{\dfrac{k_L{}^{m-1/2}}{k_R{}^{m-1/2}}\dfrac{A_L}{\varepsilon_0 A_R}\dfrac{\partial}{\partial h}\left|\dfrac{\chi_L}{\chi_R}\right|}{\dfrac{\partial}{\partial\beta}\left|\dfrac{k_L{}^{m-1/2}}{k_R{}^{m-1/2}}\dfrac{\chi_L}{\chi_R}\dfrac{A_L}{\varepsilon_0 A_R}\right|},$$

$$\mathrm{DR}\,(h,\delta) = \frac{\dfrac{\partial}{\partial h}\left|\dfrac{\chi_L}{\chi_R}\right|}{\dfrac{\partial}{\partial\delta}\left|\dfrac{\chi_L}{\chi_R}\right|},$$

and

$$\mathrm{DR}\,(h,\lambda) = \frac{\dfrac{\partial}{\partial h}\left|\dfrac{\chi_L}{\chi_R}\right|}{\dfrac{\partial}{\partial\lambda}\left|\dfrac{\chi_L}{\chi_R}\right|}. \tag{7}$$

These ratios of partial derivatives are independent of the attenuation coefficients γ_R and γ_L and are dependent on frequency ω and azimuth θ.

Calculations for the Basin and Range Velocity Structure

The Basin and Range province was chosen as a source model for study of Love/Rayleigh spectral ratios both because the earthquakes occurring within this province are typically shallow-focus and because of the availability of a large amount of seismic data for this region making possible the construction of a velocity model which may be more accurate than that obtainable for most seismically active areas. The *P* velocity structure chosen to represent the Basin and Range source region is based on an upper-mantle model (CIT 111P) determined by Archambeau *et al.* (1969). The crustal model is similar to that determined by Warren (1969) for the southeastern part of the Basin and Range province. The *P* and *S* velocity structures as well as the density distribution for the Basin and Range source model are shown in Figure 1 for the crust and in Figure 2 for the upper mantle, and the parameters for the model are listed in Table II. The *S*-velocity structure was computed from the *P*-velocity structure by assuming a Poisson's ratio of 0.25.

Two source models were considered in the present study: left lateral fault with dip angle of 90° and slip angle of 0° and a left lateral fault with dip angle of 90° and slip angle of 45°. Calculations were made for focal depths corresponding to a source successively positioned in the middle of each of the first six layers of the Basin and Range model. The partial derivatives $\partial J/\partial\beta$ were computed for the first six layers for both source models. This was accomplished by successively incrementing the shear velocity β of the first, fourth and fifth layers by $\Delta\beta = 0.1$ km/sec, and, because the velocities of the second and third layers are nearly equal, incrementing the shear velocities of both these layers together by $\Delta\beta = 0.1$ km/sec. Spectral amplitudes U_L and U_R were then calculated. The partial derivatives of spectral ratio with respect to dip angle δ, $\partial J/\partial\delta$, were computed by varying δ by 10° and computing the spectral ratio for each source depth for slip angles

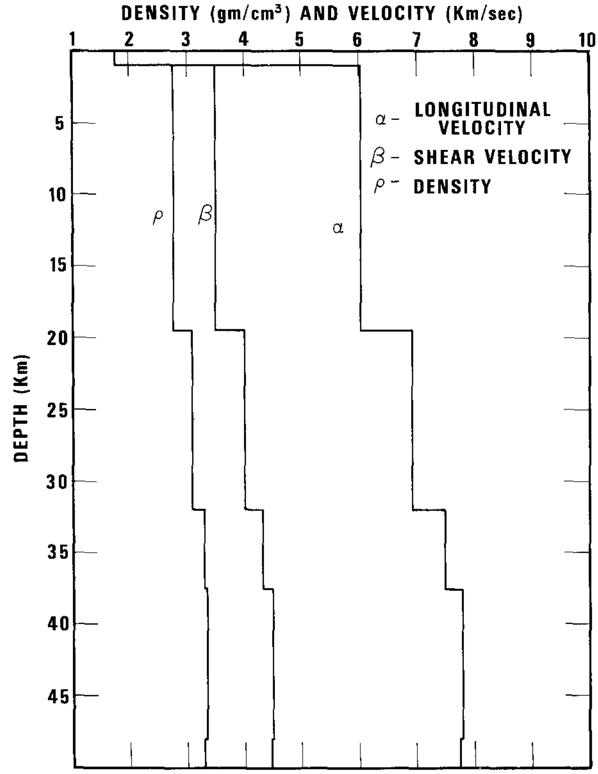

FIG. 1. Basin and Range crustal model.

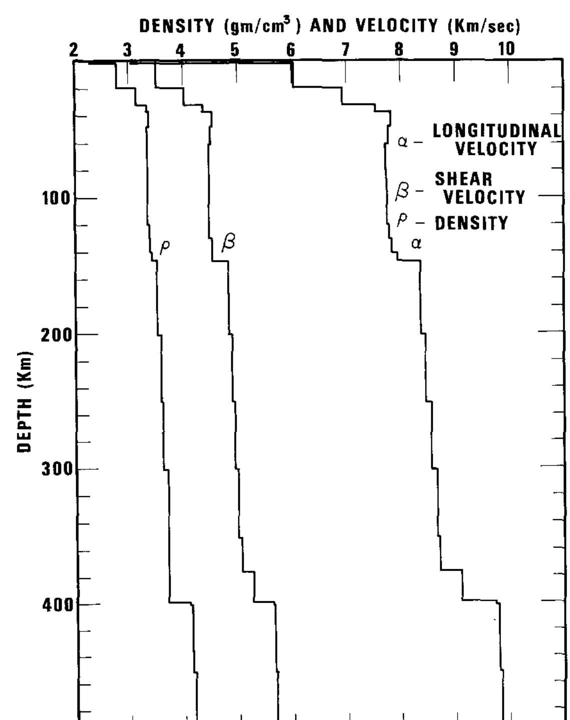

FIG. 2. Basin and Range upper-mantle model.

TABLE II

BASIN AND RANGE MODEL

Layer Thickness (km)	P Velocity (km/sec)	S Velocity (km/sec)	Density (gm/cm^3)
1.0	3.000	1.732	2.250
9.0	6.010	3.470	2.750
9.5	6.011	3.471	2.751
12.5	6.910	3.980	3.100
5.5	7.490	4.320	3.300
10.5	7.800	4.500	3.350
13.0	7.750	4.470	3.320
20.0	7.715	4.451	3.321
10.0	7.719	4.450	3.322
30.0	7.725	4.460	3.323
10.0	7.740	4.470	3.350
10.0	7.800	4.500	3.370
6.0	7.900	4.510	3.390
2.0	8.325	4.810	3.500
22.0	8.335	4.811	3.501
10.0	8.340	4.820	3.510
20.0	8.360	4.825	3.511
50.0	8.435	4.870	3.575
50.0	8.530	4.920	3.600
50.0	8.630	4.980	3.700
25.0	8.730	5.040	3.710
23.0	9.100	5.250	3.720
2.0	9.750	5.630	4.130
50.0	9.800	5.650	4.150
50.0	9.850	5.680	4.200
50.0	9.900	5.710	4.250
50.0	9.950	5.740	4.260
30.0	10.000	5.770	4.270
15.0	10.430	6.025	4.350
15.0	10.930	6.310	4.550
20.0	10.940	6.320	4.600
20.0	10.960	6.321	4.610
20.0	10.970	6.330	4.620
20.0	11.000	6.350	4.630
20.0	11.030	6.365	4.640
20.0	11.055	6.375	4.650
20.0	11.085	6.390	4.690
40.0	11.130	6.425	4.700
20.0	11.145	6.430	4.710
20.0	11.160	6.435	4.720
20.0	11.170	6.440	4.730
	11.200	6.460	4.750

λ of 0° and 45°. Partial derivatives of spectral ratio with respect to slip angle, $\partial J/\partial\lambda$, were calculated from the difference in the computed spectral ratios for slip angles 0° and 45°. Because of the large differential in slip angle, the calculated derivative is accurate enough only for rough estimates. Depth partials, $\partial J/\partial h$, were computed by taking differences in spectral ratios for sources within the ith and $(i+1)$th layers. It is possible by means of the depth derivatives given by Harkrider (1970) to determine analytically the partials $\partial J/\partial h$ for changes in source depth which occur completely within any given layer.

The fundamental mode phase and group-velocity dispersion for Rayleigh and Love waves for the Basin and Range model are shown in Figures 3 and 4. The fundamental-mode radiation pattern functions χ_R and χ_L for the two sources studied are presented in Figures 5 through 20 for periods of 20 to 40 sec. These radiation patterns show that the amount of energy propagating from a source decreases with increasing depth for periods of 20 to 40 sec. For the source with a strike of 0°, a dip angle of 90° and a slip angle of 0°, both the Rayleigh and Love radiation patterns for periods of 20 and 40 sec have four equal lobes for all depths. For the source with a strike of 0°, a dip angle of 90° and a slip angle of 45°, only the Love-wave radiation patterns have four equal lobes over the depth range examined. Love/Rayleigh spectral ratios are given in Figures 21, 22 and 23 for a few selected source geometries. Figure 21 illustrates the variation in J as a function of θ. The dependence of J on the source parameters λ and δ is illustrated in Figure 22, and Figure 23 shows the change in J caused by change in only focal depth. From Figures 21, 22 and 23, the orientation of the source can be seen to have as great an effect on the Love/Rayleigh spectral ratio as does the focal depth. The period at which a maximum occurs in the Love/Rayleigh ratios (corresponding to a minimum in the Rayleigh-wave amplitude) can also be seen to vary with source parameters such as dip and slip angles as well as with focal depth.

The partial derivative ratios DR (h, β), DR (h, δ) and DR (h, λ) given in equation (6) may be interpreted as the changes $\Delta\beta$, $\Delta\delta$, and $\Delta\lambda$, respectively, which would produce the same change in J as a change Δh in h of 1 km. Therefore, the values of DR (h, β), DR (h, δ) and DR (h, λ) given in Tables III, IV and V, respectively, may be used to determine how accurately the shear velocity of the Earth and the dip and slip angles of the source must be known in order to determine the focal depth to some desired accuracy. Consider, for example, that it is desired that the focal depth be determined correct to within ± 5 km. Then the values of $\Delta\beta$, $\Delta\delta$, and $\Delta\lambda$ which would produce the same change in J as a change in h of 5 km are given by multiplying the values of DR (h, β), DR (h, δ) and DR (h, λ) in Tables III, IV and V by a factor of 5. The resulting $\Delta\beta$, $\Delta\delta$ and $\Delta\lambda$ are larger, respectively, than 0.2 km/sec, 10° and 10° for sources in certain layers but are smaller for sources in others. Moreover, $\Delta\beta$, $\Delta\delta$, and $\Delta\lambda$ are a function of azimuth, and, if a combination of changes in shear velocities, dip angle, and slip angle were made, the result could be equal to a Δh of 5 km with $\Delta\beta < 0.2$ km/sec, $\Delta\delta < 10°$, and $\Delta\lambda < 10°$ for sources within several of the layers.

Therefore, the conclusion must be that the accuracy of the focal depth determined from Love/Rayleigh spectral ratios is very much dependent not only on the velocity structure and source parameters but also on the layer in which the source is located and the azimuth of the recording station from the source. In some cases, the shear velocity of the model near the source would need to be known to better than $\pm$ 0.2 km/sec and the dip and slip angles to better than $\pm 10°$ in order to attain an accuracy of ± 5 km in the focal depth.

If spectral ratios are available for several different values of period and several stations, the depth resolution could be better. However, consideration of the first or fifth column of Table III for a slip angle of 0° shows that the error can be of the same sign at every

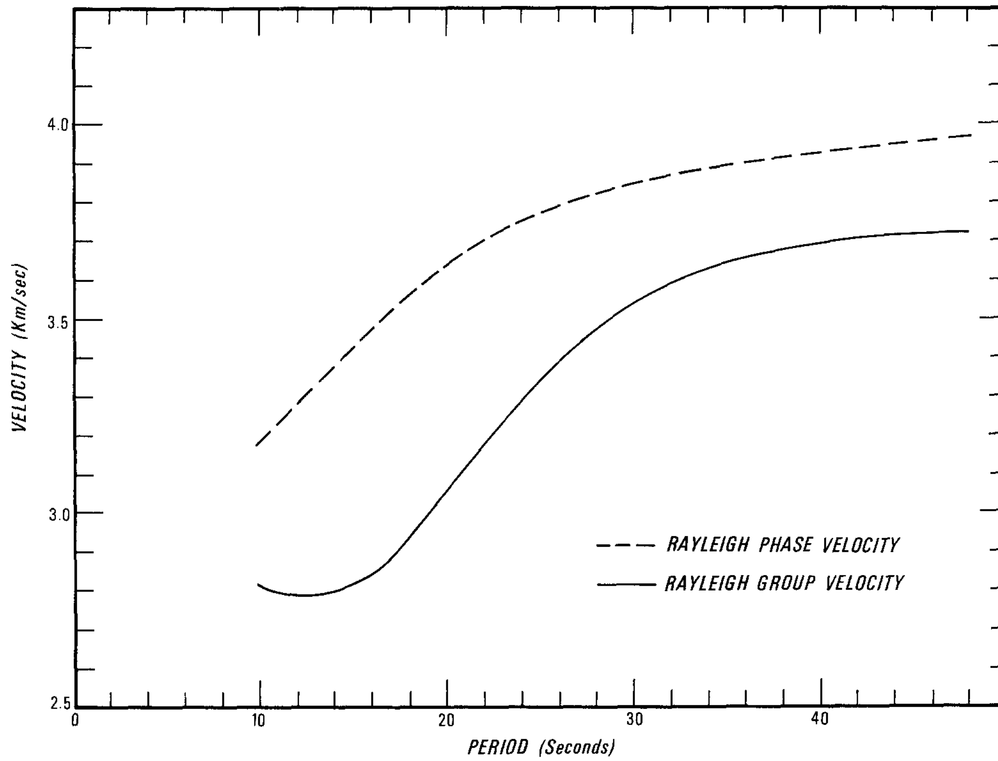

FIG. 3. Fundamental-mode Rayleigh-wave dispersion for the Basin and Range model.

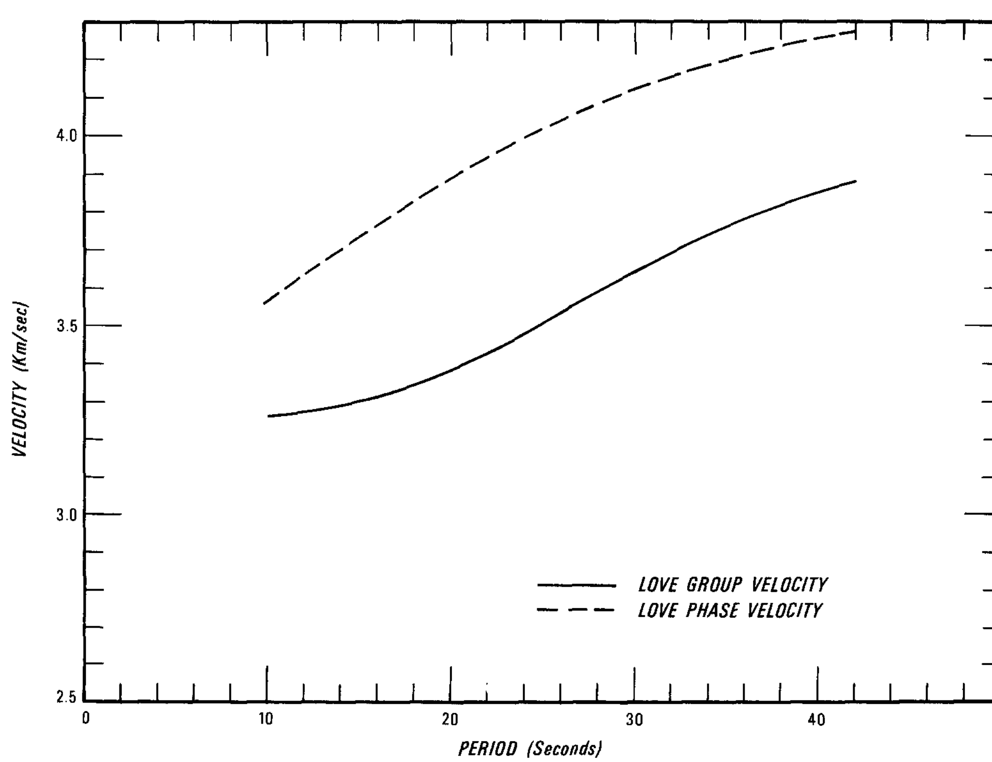

FIG. 4. Fundamental-mode Love-wave dispersion for the Basin and Range model.

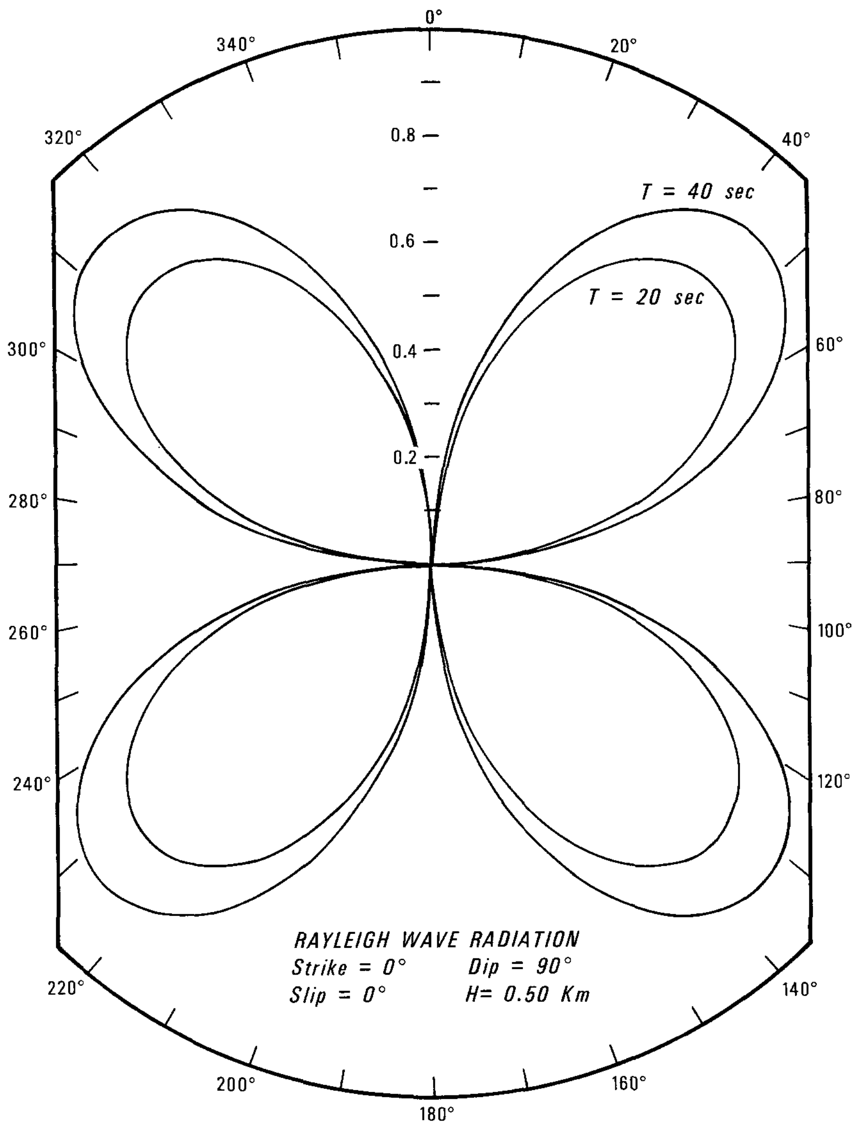

FIG. 5. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 0.5 km and with a strike of 0° and a slip of 0°.

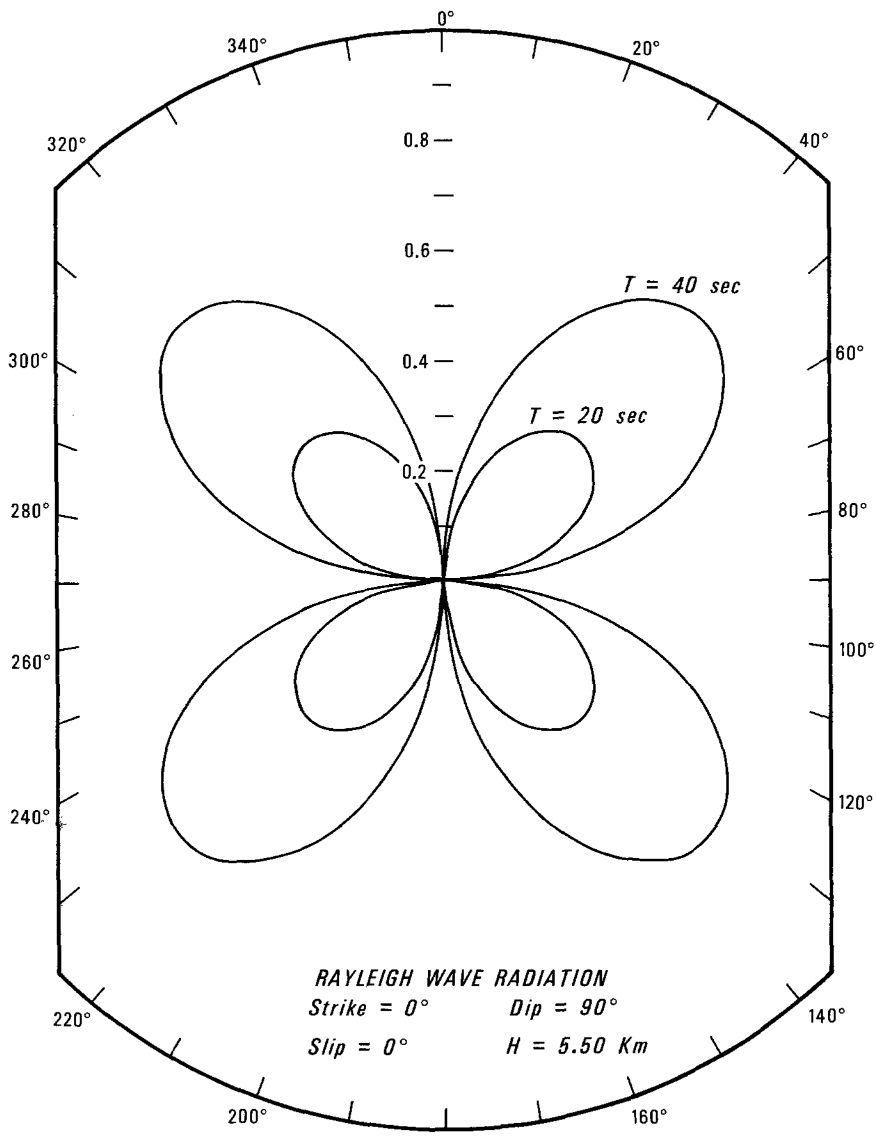

FIG. 6. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 5.5 km and with a strike of 0° and a slip of 0°.

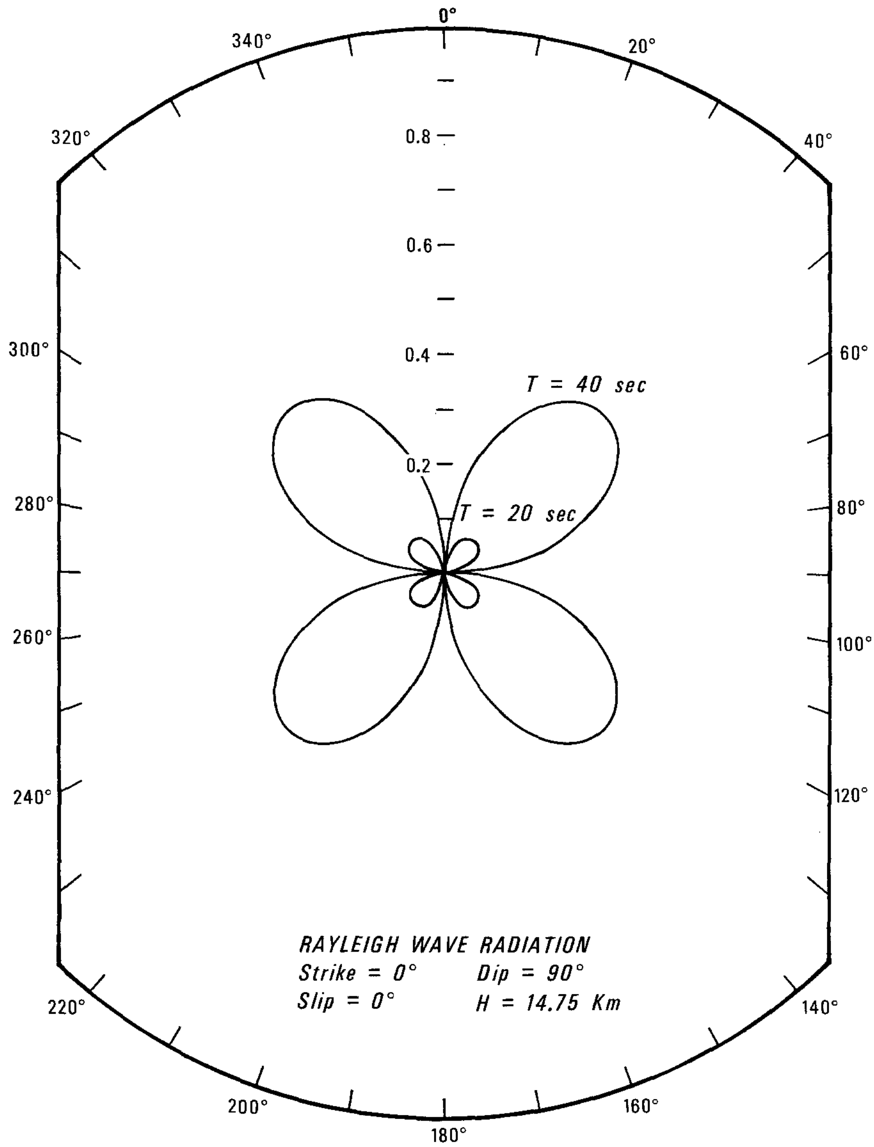

FIG. 7. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 14.75 km and with a strike of 0° and a slip of 0°.

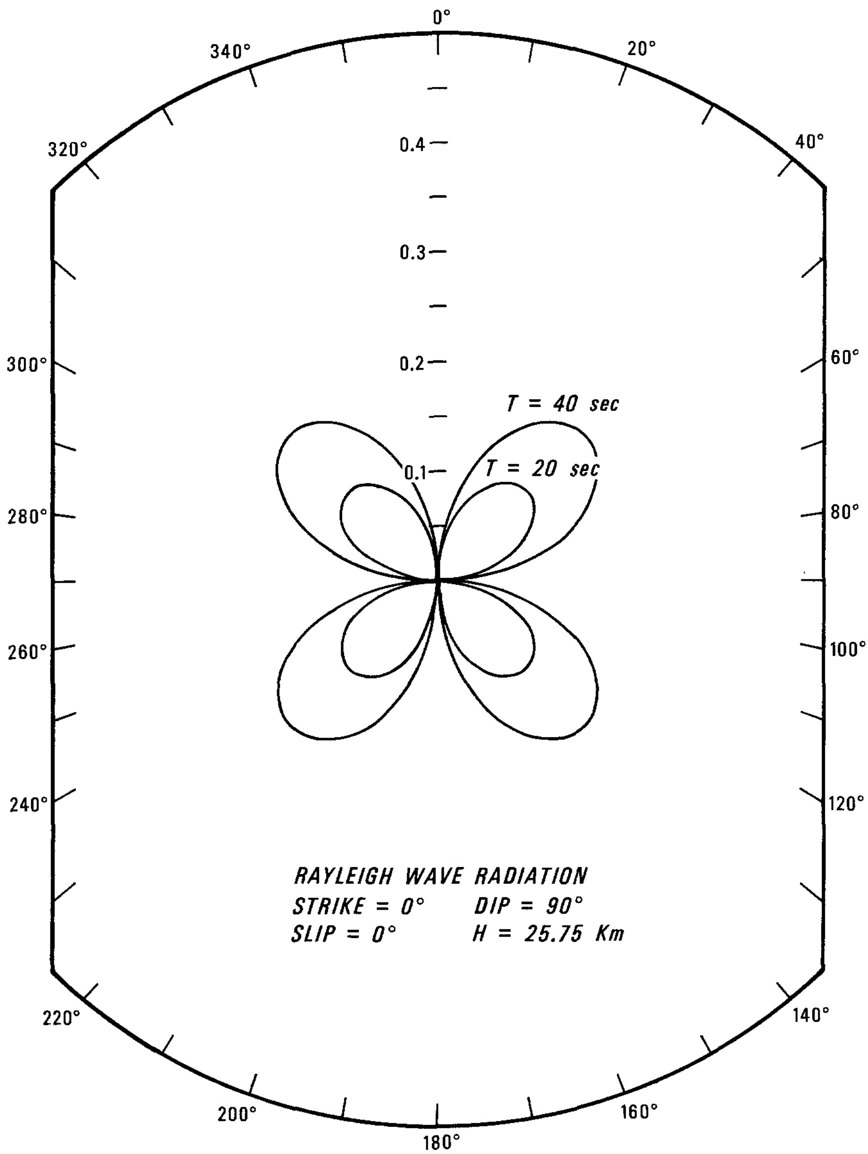

FIG. 8. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 25.75 km and with a strike of 0° and a slip of 0°.

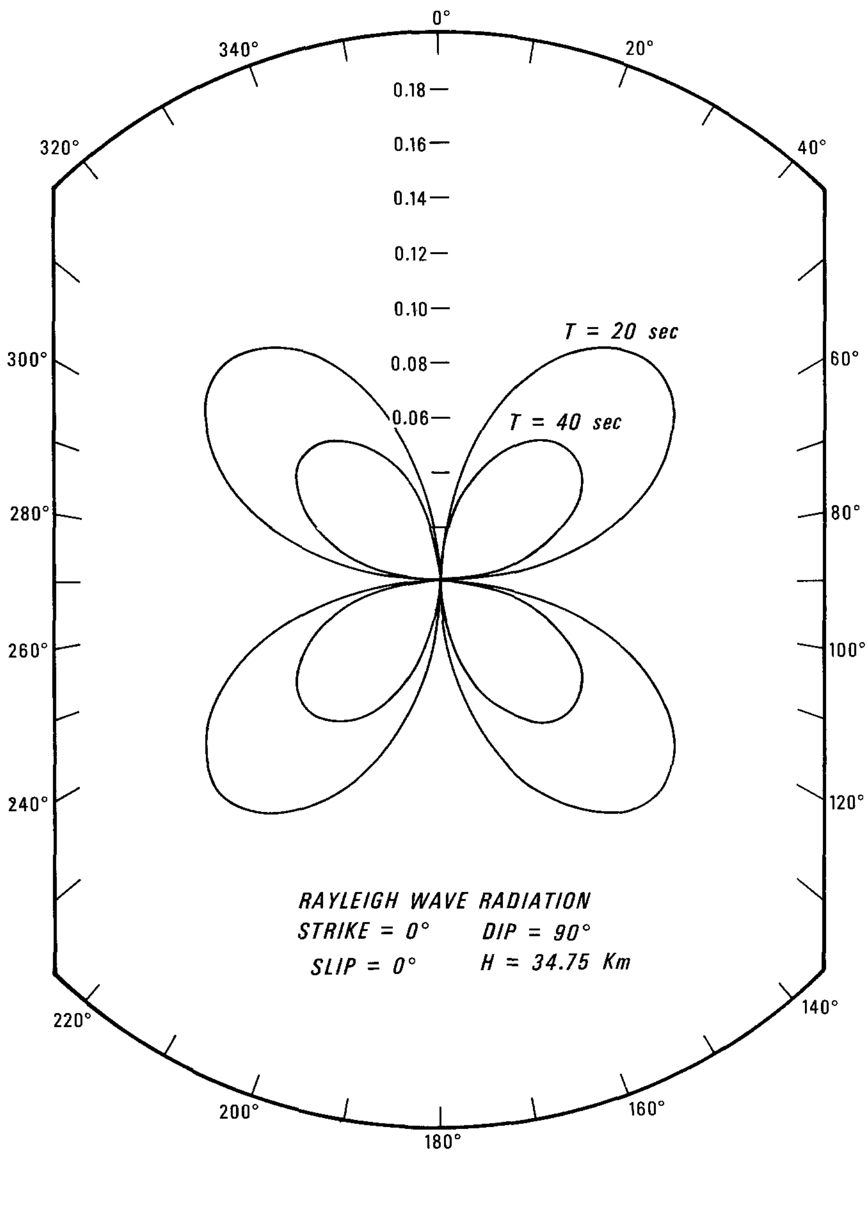

FIG. 9. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 34.75 km and with a strike of 0° and a slip of 0°.

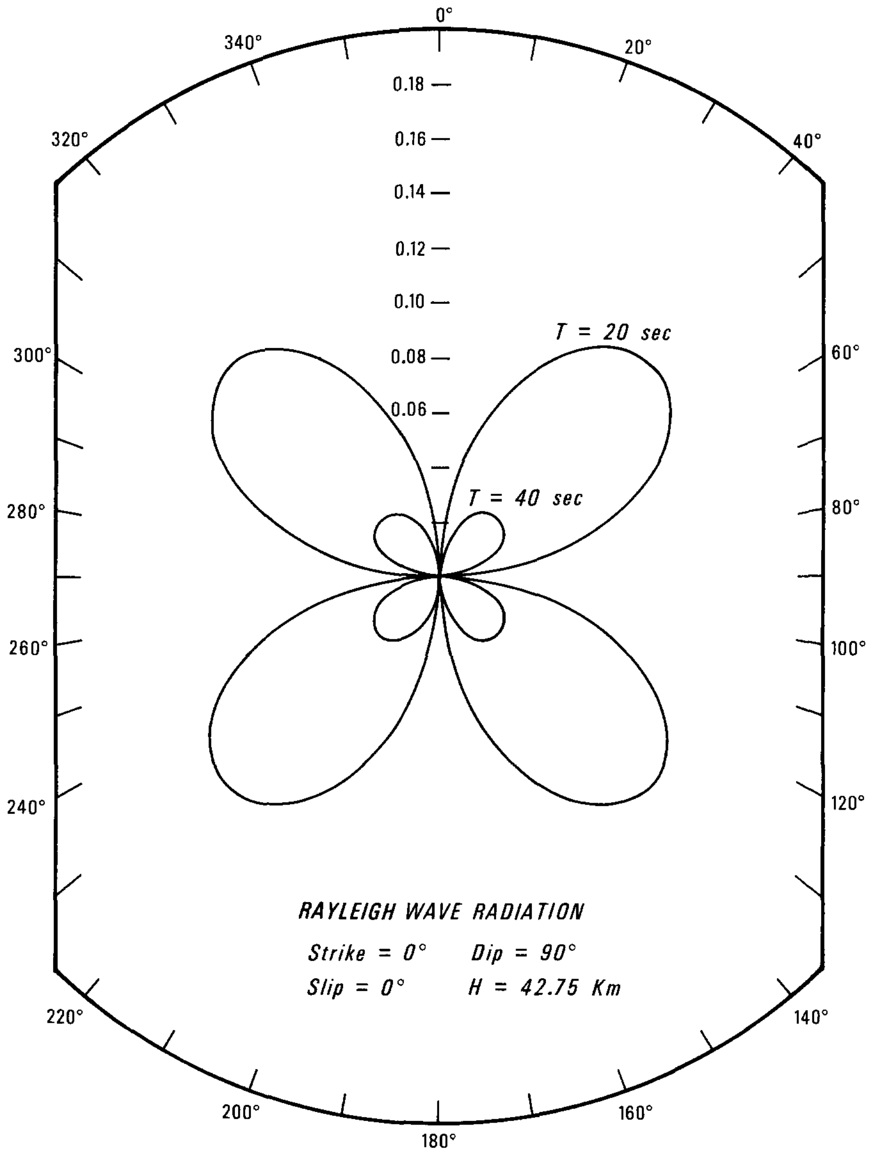

FIG. 10. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 42.75 km and with a strike of 0° and a slip of 0°.

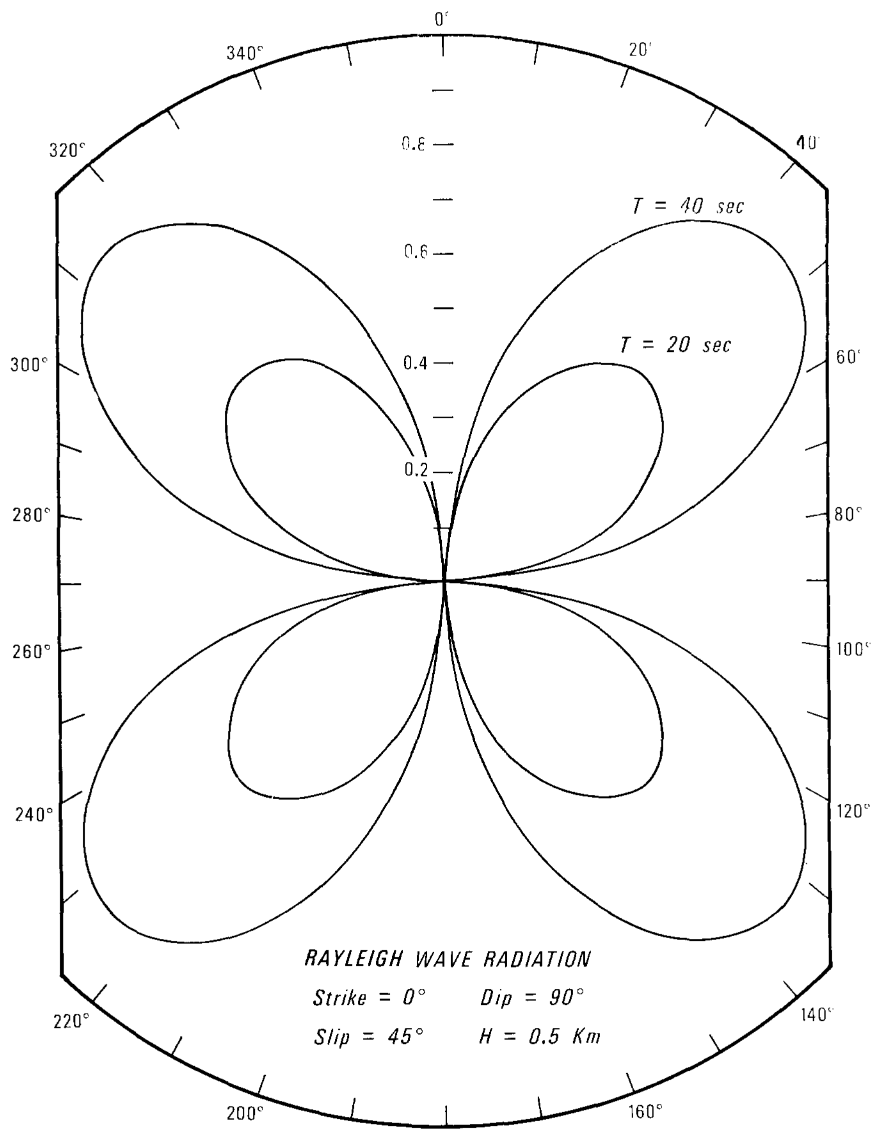

FIG. 11. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 0.5 km and with a strike of 0° and a slip of 45°.

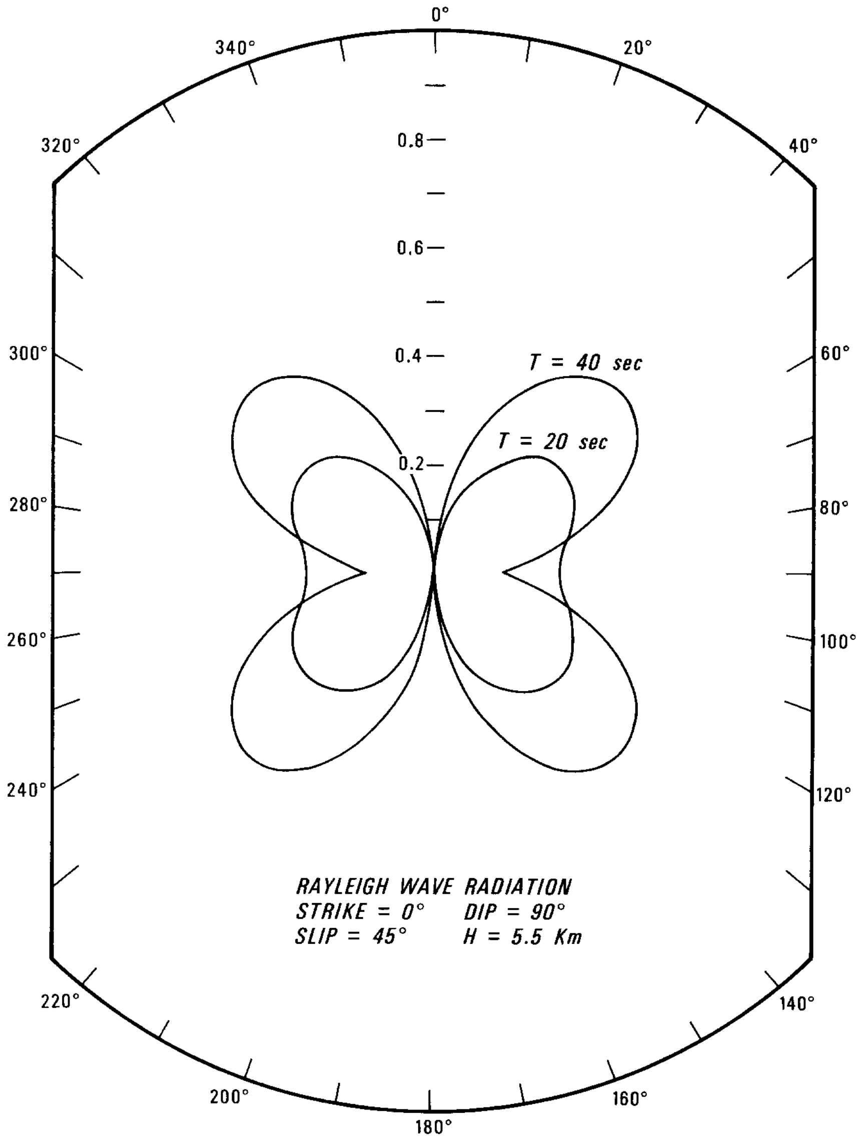

FIG. 12. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 5.5 km and with a strike of 0° and a slip of 45°.

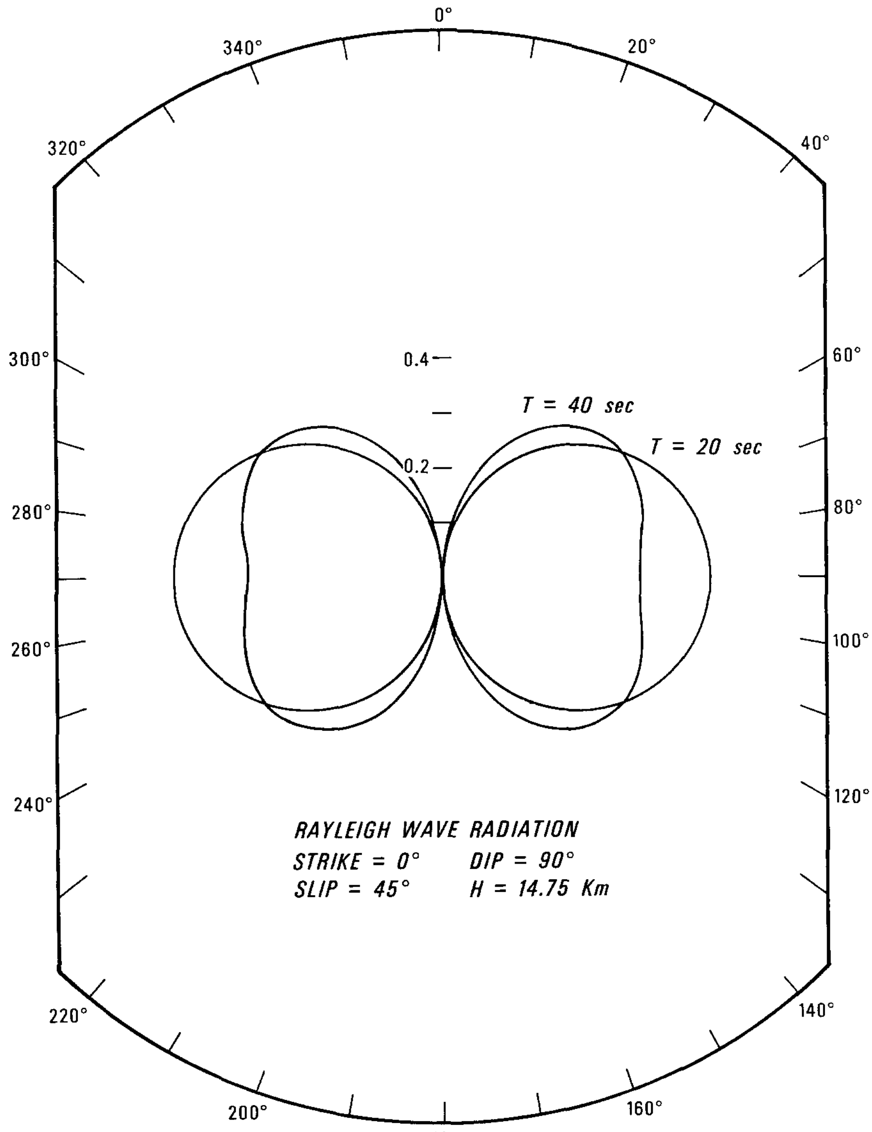

FIG. 13. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 14.75 km and with a strike of 0° and a slip of 45°.

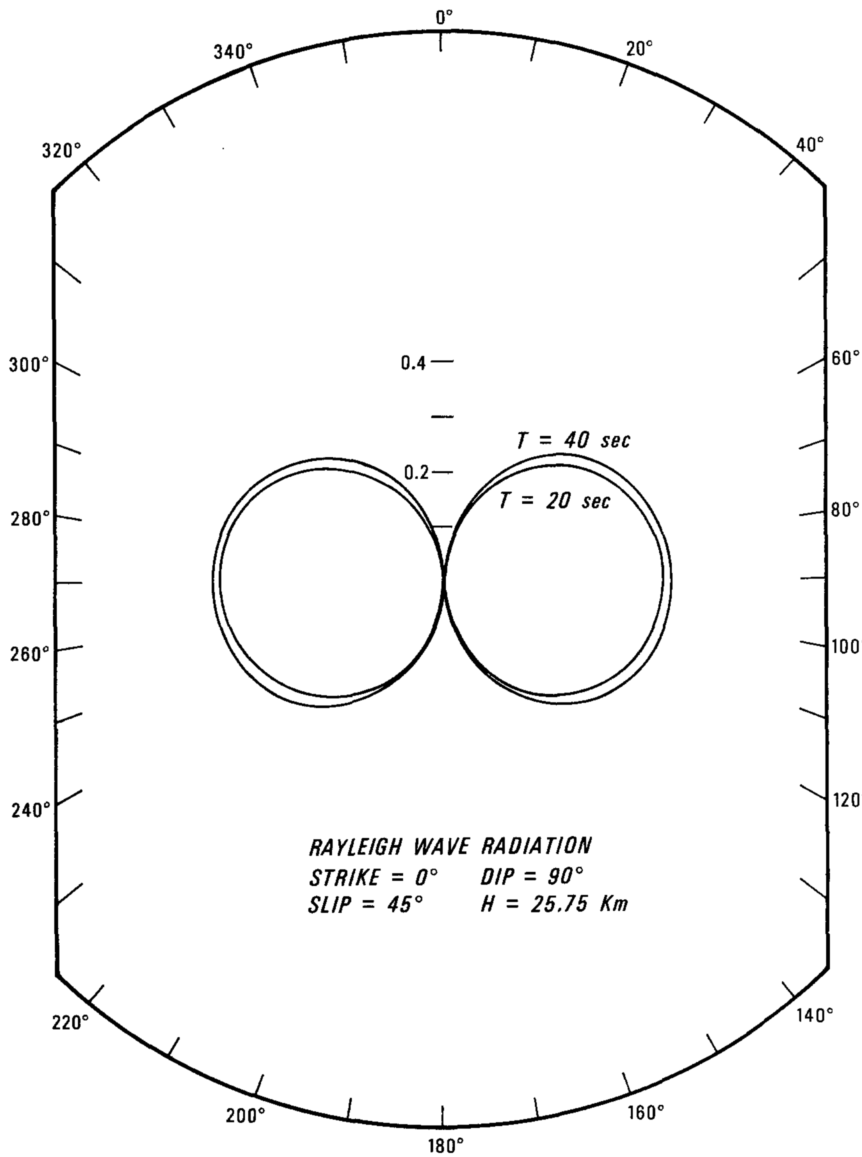

FIG. 14. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 25.75 km and with a strike of 0° and a slip of 45°.

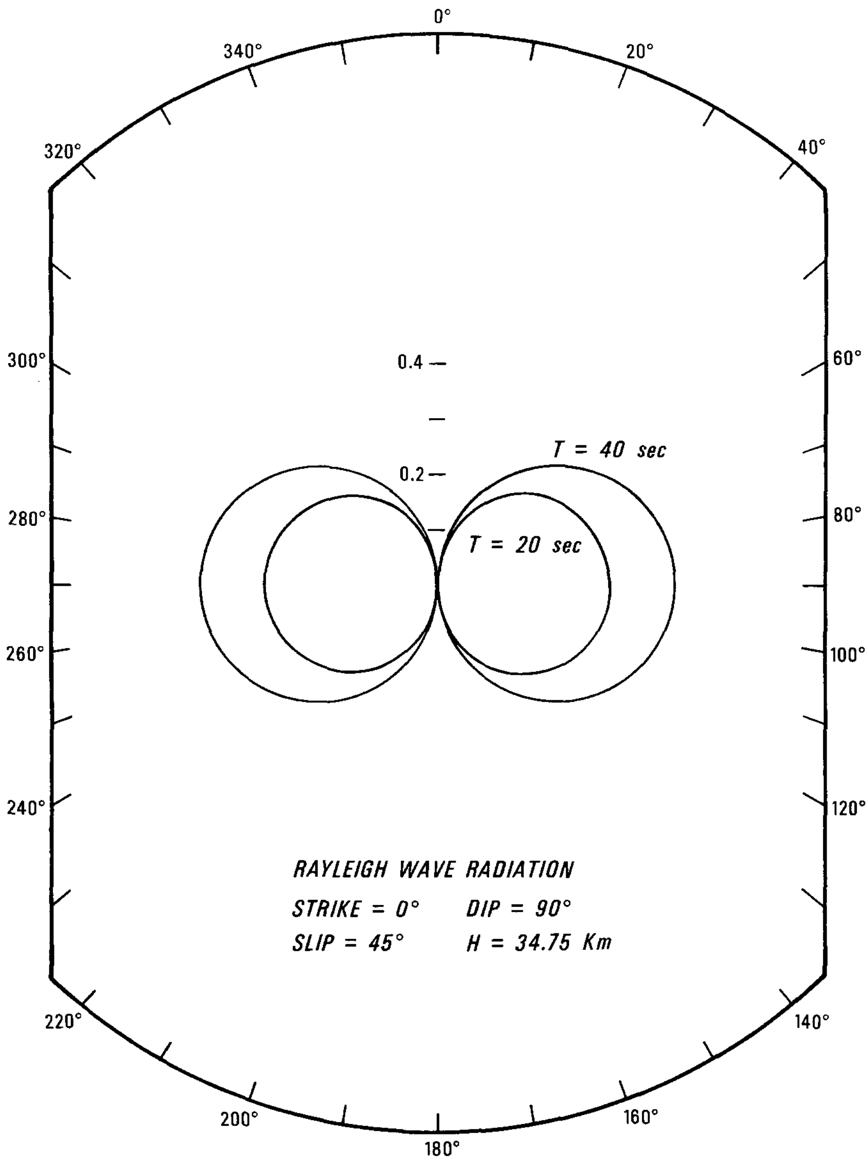

FIG. 15. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 34.75 km and with a strike of 0° and a slip of 45°.

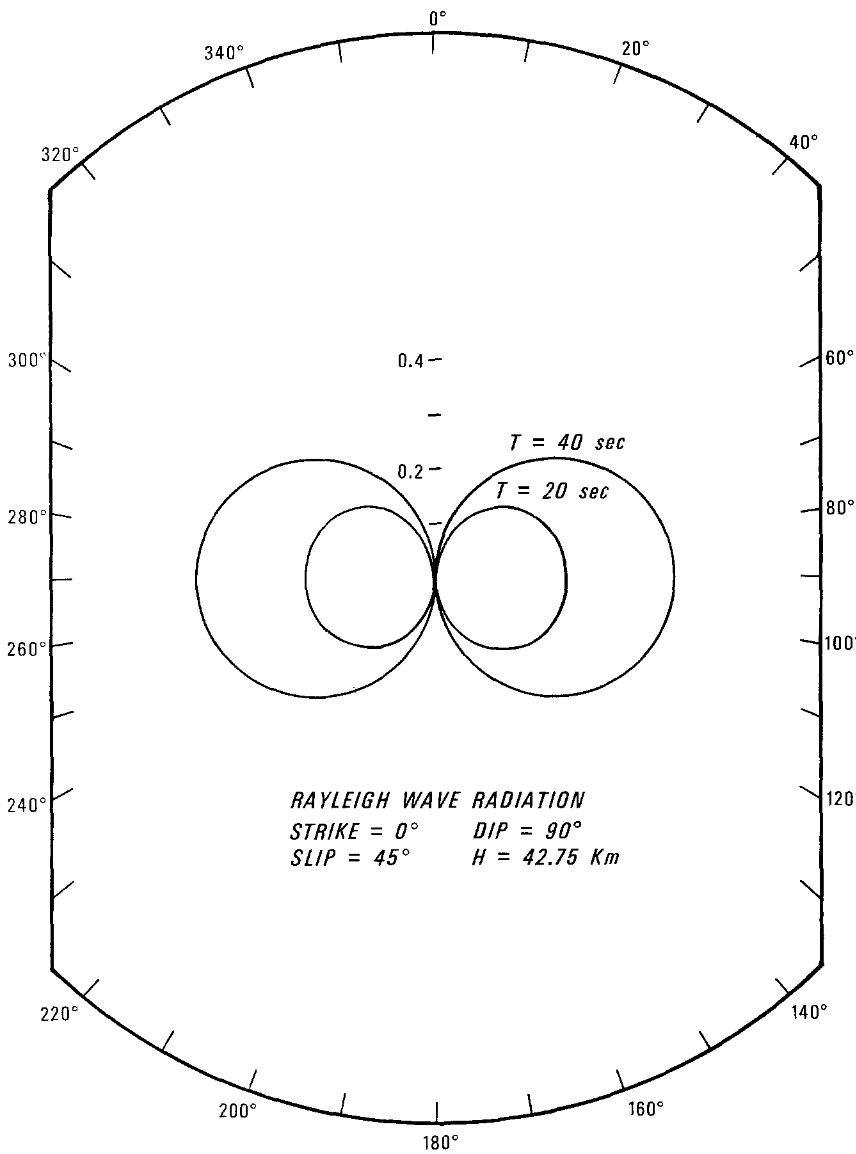

FIG. 16. Rayleigh radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 42.75 km and with a strike of 0° and a slip of 45°.

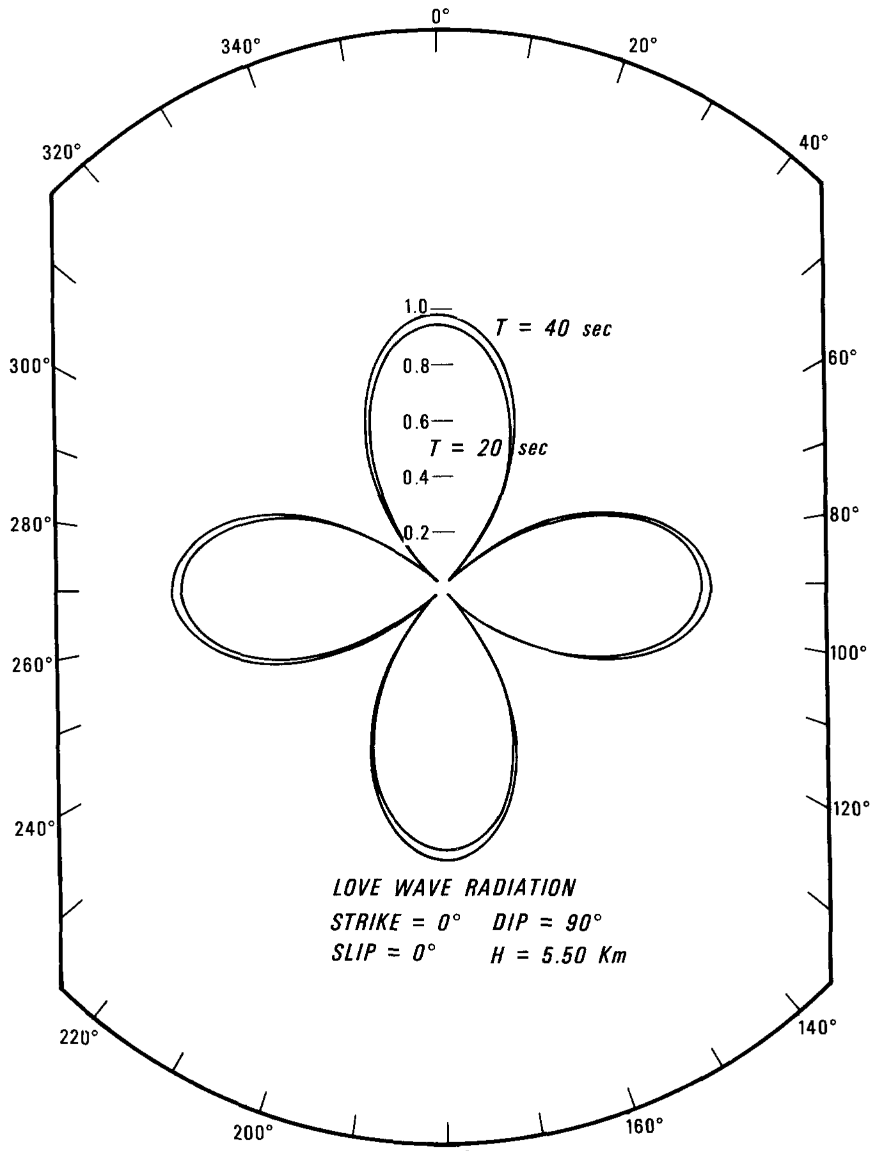

FIG. 17. Love radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 0.5 km and with a strike of 0° and a slip of 0°.

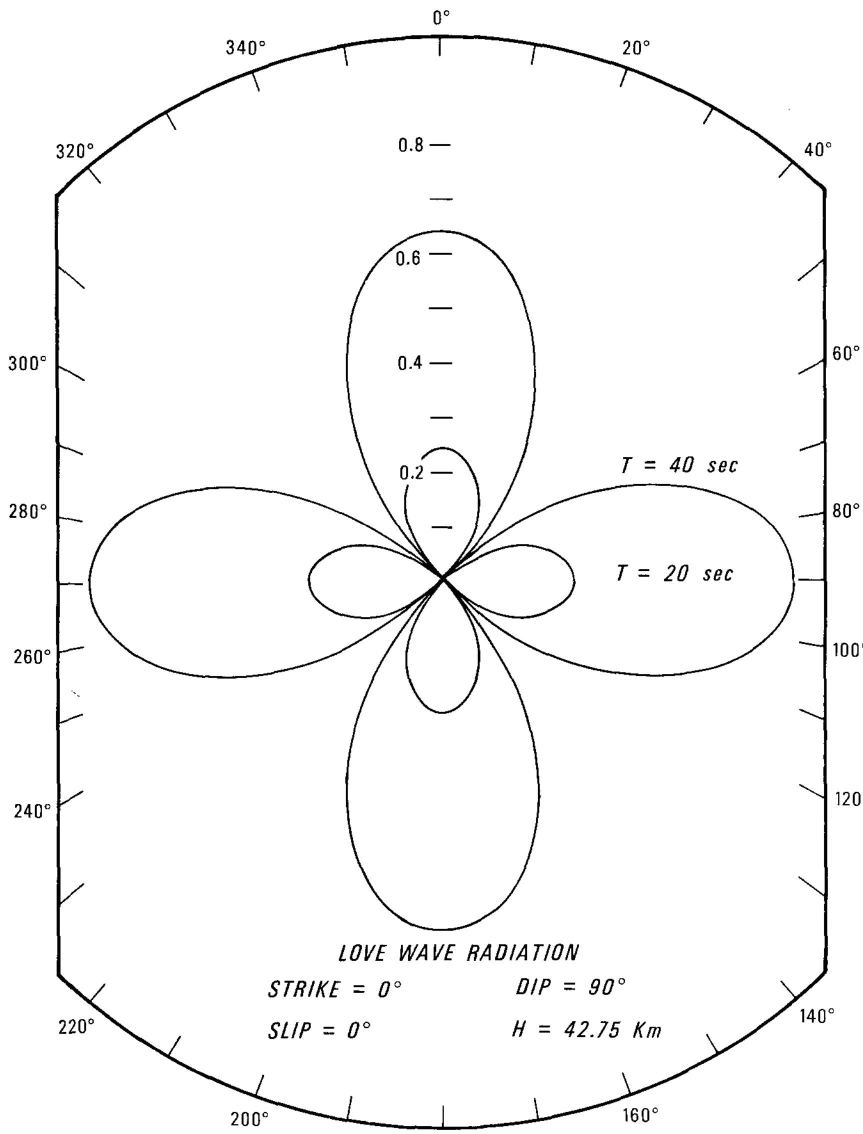

FIG. 18. Love radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 42.75 km and with a strike of 0° and a slip of 0°.

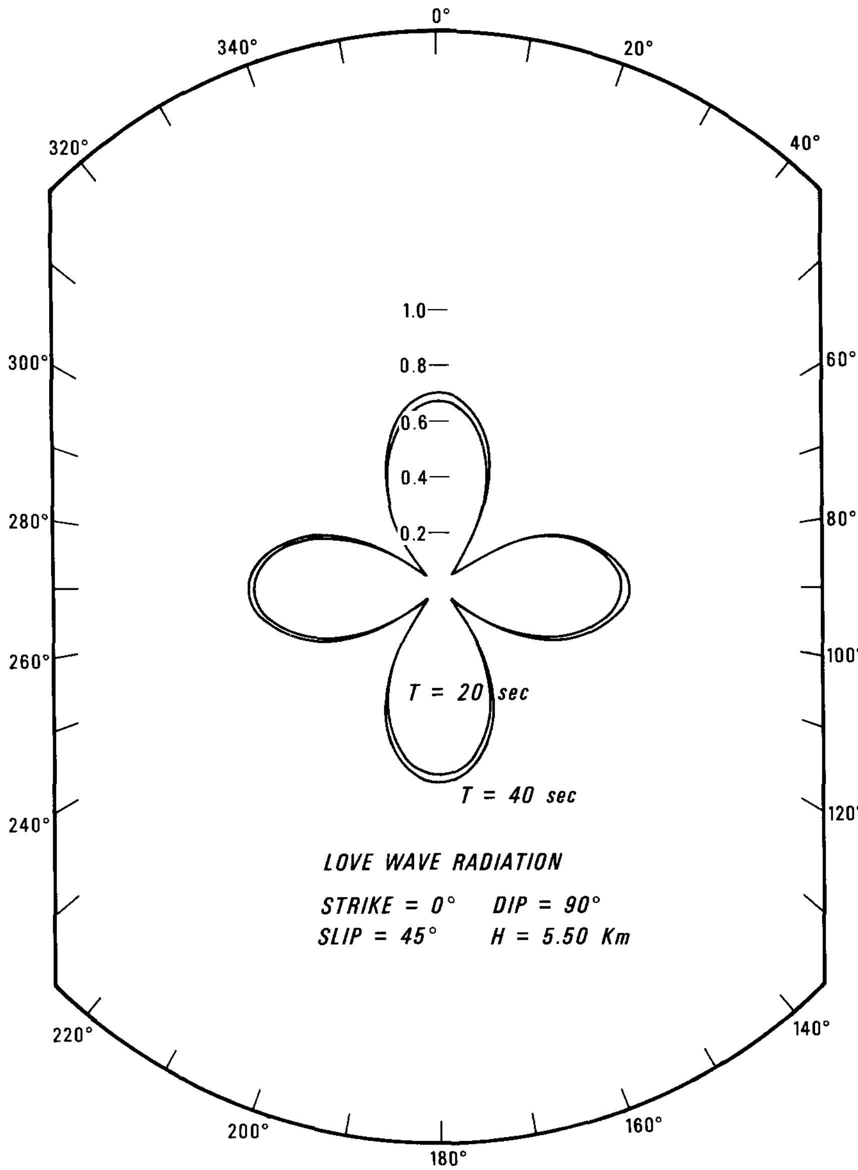

FIG. 19. Love radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 0.5 km and with a strike of 0° and a slip of 45°.

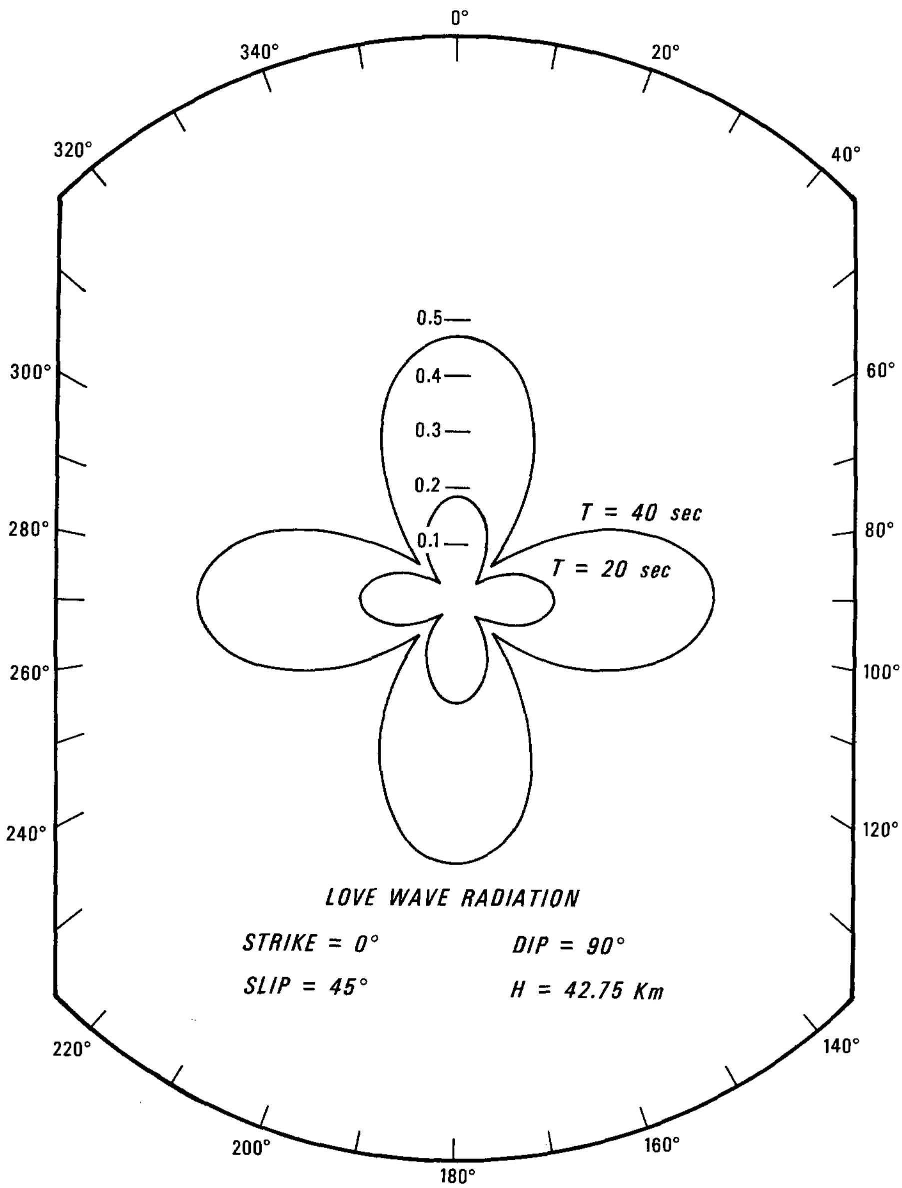

FIG. 20. Love radiation pattern for a double-couple representation of a left lateral vertical fault source at a depth of 42.75 km and with a strike of 0° and a slip of 45°.

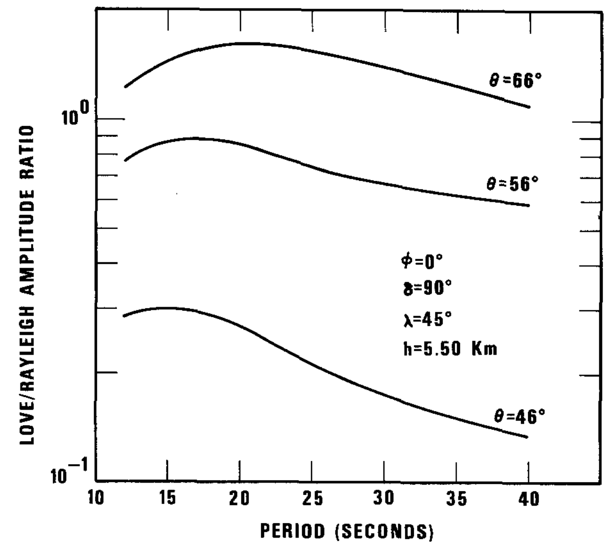

FIG. 21. Love/Rayleigh amplitude ratio as a function of period and azimuth.

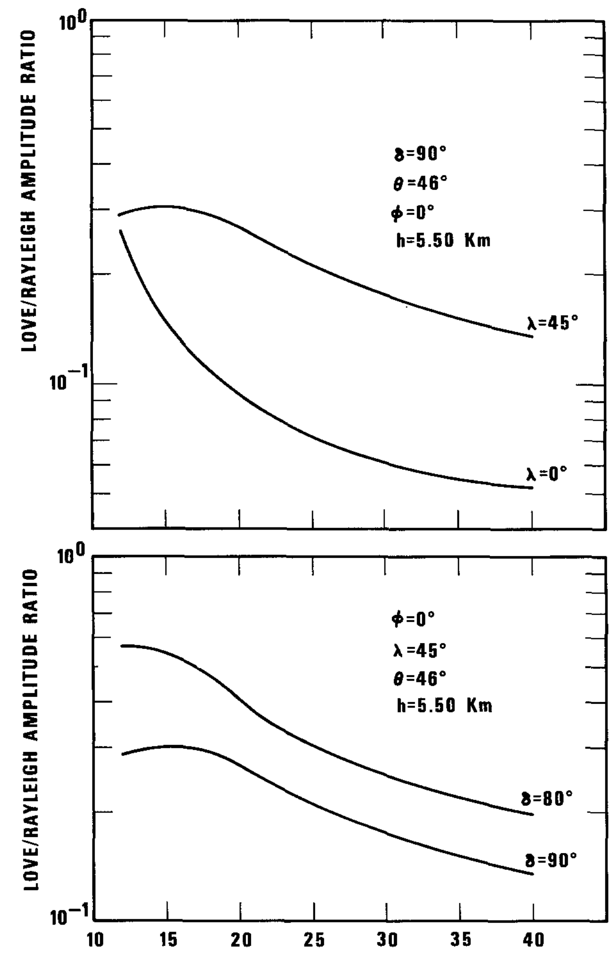

FIG. 22. Love/Rayleigh amplitude ratio as a function of period, slip angle, and dip angle.

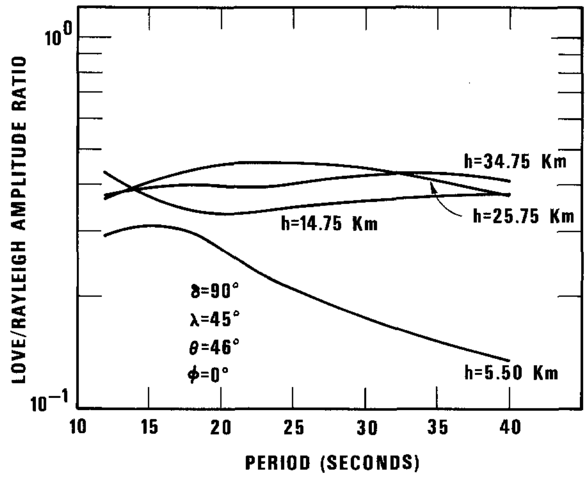

FIG. 23. Love/Rayleigh amplitude ratio as a function of period and depth.

station and frequency, and one would not, therefore, expect it to be minimized by any "least squares" procedure. With respect to determining depth by finding nulls in the spectra, column two of Table III shows that the errors can have the same pattern as a function of azimuth at every frequency, thus leading to a consistent shift of the null frequency.

Discussion

The accuracy of the focal depth determined from the spectral ratio of Love-wave to Rayleigh-wave energy depends upon the accuracy of the mathematical models used for the Earth structure and for the source mechanism. Recent studies by Tsai and Aki (1970a, b, c) and Canitez and Toksöz (1971) have concluded that it is possible to determine the focal depth to an accuracy of a few kilometers if the source mechanism and the Earth structure are reasonably well known. However, in order to define the terms "reasonably well known", the partial derivative DR (h, β), DR (h, δ) and DR (h, λ) should be available for models of the Earth structure and for the source mechanism which are close to those being assumed in the calculation of the focal depth. In some cases, it probably will not be possible to estimate the focal depth to within a few kilometers of the correct value from surface-wave spectral information alone.

We see that it is not true, as often hypothesized, that error resulting from lack of knowledge of the velocity structure will be reduced to negligible proportions by using Love/Rayleigh spectral ratios, instead of Love or Rayleigh spectra values alone, to determine source parameters. Also, the difficulty in determining the dip and slip angles to better than 10° may in many cases preclude the determination of focal depth from surface-wave spectral information to an accuracy of a few kilometers.

Acknowledgments

We wish to thank Drs. S. Alexander and R. Blandford for their encouragement and their many helpful discussions. We also thank Dr. E. A. Flinn for critically reading this paper.

TABLE III

DR(h,β)

T = 12 sec STRIKE = 0° DIP = 90° SLIP = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-9.6514	-.07110	.02670	-.2520	-.03618
20.00	-9.3757	-.07134	.02676	-.2570	-.03690
30.00	-9.3119	-.07123	.02672	-.2573	-.03709
40.00	-9.4139	-.07130	.02675	-.2558	-.03687
44.00	-8.2707	-.07076	.02654	-.2598	-.03792
50.00	-9.4139	-.07130	.02675	-.2558	-.03687
60.00	-9.3145	-.07124	.02672	-.2559	-.03677
70.00	-9.3757	-.07134	.02676	-.2570	-.03690
80.00	-9.6514	-.07110	.02670	-.2520	-.03618
90.00	.0	.0	.0	.0	.0
100.00	-9.6514	-.07110	.02670	-.2520	-.03618
110.00	-9.3757	-.07134	.02676	-.2570	-.03690
120.00	-9.3119	-.07123	.02672	-.2573	-.03709
130.00	-9.4139	-.07130	.02675	-.2558	-.03687
134.00	-8.2707	-.07076	.02654	-.2598	-.03792
140.00	-9.4139	-.07130	.02675	-.2558	-.03687
150.00	-9.3145	-.07124	.02672	-.2559	-.03677
160.00	-9.3757	-.07134	.02676	-.2570	-.03690
170.00	-9.6514	-.07110	.02670	-.2520	-.03618
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.2057	.005975	.006652	.002853	.01845
20.00	-.2513	.009433	.008718	-.005852	-.00714
30.00	-.2343	.009325	.011283	-.007362	-.00961
40.00	-.2212	.008848	.010059	-.001836	-.00236
44.00	-.1404	.001230	.001204	-.005220	-.01537
50.00	-.2212	.008848	.010059	-.001836	-.00236
60.00	-.2502	.009190	.008773	-.002499	-.00716
70.00	-.2513	.009433	.008718	-.005852	-.00714
80.00	-.2057	.005975	.006652	.002853	.01845
90.00	.0	.0	.0	.0	.0
100.00	-.2057	.005975	.006652	.002853	.01845
110.00	-.2513	.009433	.008718	-.005852	-.00714
120.00	-.2343	.009325	.011283	-.007362	-.00961
130.00	-.2212	.008848	.010059	-.001836	-.00236
134.00	-.1404	.001230	.001204	-.005220	-.01537
140.00	-.2212	.008848	.010059	-.001836	-.00236
150.00	-.2502	.009199	.008773	-.002499	-.00716
160.00	-.2513	.009433	.008718	-.005852	-.00714
170.00	-.2057	.005975	.006652	.002853	.01845
180.00	.0	.0	.0	.0	.0

TABLE III—*Continued*

DR(h,β)

T = 20 sec STRIKE = 0° DIP = 90° SLIP = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-5.9840	-.06504	-2.4824	.02374	-.01961
20.00	-5.6680	-.06495	-2.4678	.02604	-.02150
30.00	-5.9070	-.06495	-2.4934	.02602	-.02149
40.00	-5.1638	-.06504	-2.4769	.02525	-.02085
44.00	-5.0104	-.06478	-2.4740	.02575	-.02127
50.00	-5.1638	-.06504	-2.4769	.02525	-.02085
60.00	-5.9070	-.06495	-2.4935	.02605	-.02151
70.00	-5.6680	-.06495	-2.4678	.02604	-.02150
80.00	-5.9840	-.06504	-2.4824	.02374	-.01961
90.00	.0	.0	.0	.0	.0
100.00	-5.9840	-.06504	-2.4824	.02374	-.01961
110.00	-5.6680	-.06495	-2.4678	.02604	-.02150
120.00	-5.9070	-.06495	-2.4934	.02602	-.02149
130.00	-5.1638	-.06504	-2.4769	.02525	-.02085
134.00	-5.0104	-.06478	-2.4740	.02525	-.02127
140.00	-5.1638	-.06504	-2.4769	.02538	-.02085
150.00	-5.9070	-.06495	-2.4935	.02605	-.02151
160.00	-5.6680	-.06495	-2.4678	.02604	-.02150
170.00	-5.9840	-.06504	-2.4824	.02374	-.01961
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-1.4430	-.02531	-.1445	-.09747	-.2405
20.00	-1.4335	-.02518	-.1471	-.10007	-.2505
30.00	-1.4505	-.02529	-.1464	-.09960	-.2349
40.00	-1.4231	-.02489	-.1514	-.10407	-.2305
44.00	-1.4213	-.02485	-.1227	-.08207	-.3670
50.00	-1.4231	-.02489	-.1514	-.10407	-.2305
60.00	-1.4552	-.02537	-.1463	-.09951	-.2344
70.00	-1.4335	-.02518	-.1471	-.10007	-.2505
80.00	-1.4430	-.02531	-.1445	-.09747	-.2405
90.00	.0	.0	.0	.0	.0
100.00	-1.4430	-.02531	-.1445	-.09747	-.2405
110.00	-1.4335	-.02518	-.1471	-.10007	-.2505
120.00	-1.4505	-.02529	-.1464	-.09660	-.2349
130.00	-1.4231	-.02489	-.1514	-.10407	-.2305
134.00	-1.4213	-.02485	-.1227	-.08207	-.3670
140.00	-1.4231	-.02489	-.1514	-.10407	-.2305
150.00	-1.4552	-.02537	-.1463	-.09951	-.2344
160.00	-1.4335	-.02518	-.1471	-.10007	-.2505
170.00	-1.4430	-.02531	-.1445	-.99747	-.2405
180.00	.0	.0	.0	.0	.0

DR(h,β)

T = 40 sec STRIKE = 0° DIP = 90° SLIP = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-5.4639	-.04658	-.06326	-.05074	-.1059
20.00	-4.5210	-.04639	-.06294	-.05114	-.1069
30.00	-4.8319	-.04659	-.06330	-.05104	-.1064
40.00	-4.2014	-.04664	.06343	-.05103	-.1066
44.00	-4.0110	-.04698	-.06433	-.05024	-.1045
50.00	-4.2014	-.04664	-.06343	-.05103	-.1066
60.00	-4.8318	-.04649	-.06313	-.05102	-.1064
70.00	-4.5210	-.04639	-.06294	-.05114	-.1069
80.00	-5.4639	-.04658	-.06326	-.05074	-.1059
90.00	.0	.0	.0	.0	.0
100.00	-5.4639	-.04658	-.06326	-.05074	-.1059
110.00	-4.5210	-.04639	-.06294	-.05114	-.1069
120.00	-4.8319	-.04659	-.06330	-.05104	-.1064
130.00	-4.2014	-.04664	-.06343	-.05103	-.1066
134.00	-4.0110	-.04698	-.06433	-.05024	-.1045
140.00	-4.2014	-.04664	-.06343	-.05103	-.1066
150.00	-4.8318	-.04649	-.06313	-.05102	-.1064
160.00	-4.5210	-.04639	-.06294	-.05114	-.1069
170.00	-5.4639	-.04658	-.06326	-.05074	-.1059
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.06865	-.2748	-.1464	-.2716	.03832
20.00	-.06877	-.2748	-.1528	-.2828	.03557
30.00	-.06902	-.2761	-.1559	-.2887	.03599
40.00	-.06794	-.2716	-.1563	-.2897	.03641
44.00	-.06751	-.2692	-.1558	-.2889	.03638
50.00	-.06794	-.2716	-.1563	-.2897	.03641
60.00	-.06902	-.2762	-.1559	-.2887	.03607
70.00	-.06877	-.2748	-.1528	-.2828	.03557
80.00	-.06865	-.2748	-.1464	-.2716	.03832
90.00	.0	.0	.0	.0	.0
100.00	-.06865	-.2748	-.1464	-.2716	.03832
110.00	-.06877	-.2748	-.1428	-.2828	.03557
120.00	-.06902	-.2761	-.1559	-.2887	.03599
130.00	-.06794	-.2716	-.1563	-.2897	.03641
134.00	-.06751	-.2692	-.1558	-.2889	.03638
140.00	-.06794	-.2716	-.1563	-.2897	.03641
150.00	-.06902	-.2762	-.1559	-.2887	.03607
160.00	-.06877	-.2748	-.1528	-.2828	.03557
170.00	-.06865	-.2748	-.1464	-.2716	.03832
180.00	.0	.0	.0	.0	.0

TABLE III—*Continued*

DR(h,β)

T = 12 sec STRIKE = 0° DIP = 90° SLIP = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-1.4247	-.1254	.05167	.3409	.02594
20.00	-1.1554	-.1231	.05064	.2484	.01754
30.00	- .6552	-.1177	.04626	.1371	.00836
40.00	- .1420	-.0806	.01047	.0119	.00028
44.00	- .0383	-.0375	-.02583	-.0211	-.00125
50.00	- .1101	-.0678	.01884	.0212	-.00074
60.00	- .2700	-.0579	.07102	.2020	.00338
70.00	.3284	.0643	.08568	.2739	.00236
80.00	6.7215	.5097	.09427	.2819	-.00011
90.00	- .0614	4.2732	.09746	.2779	-.00116
100.00	6.7215	.5097	.09427	.2819	-.00011
110.00	.3284	.0643	.08568	.2739	.00236
120.00	- .2700	-.0579	.07102	.2020	.00338
130.00	- .1101	-.0678	.01884	.0212	-.00074
134.00	- .0328	-.0337	-.02650	-.0212	-.00154
140.00	- .1420	-.0806	.01047	.0119	.00028
150.00	- .6552	-.1177	.04626	.1371	.00836
160.00	-1.1554	-.1231	.05064	.2484	.01754
170.00	-1.4247	-.1254	.05167	.3409	.02594
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	.04561	-.03085	.1533	-.04328	-.05126
20.00	.03376	-.03266	-.6900	.33353	.03831
30.00	.01704	-.03458	-.1165	.09991	.06774
40.00	.00068	-.04103	-.0672	.08912	.09471
44.00	-.00318	-.04308	-.0522	.07238	.07532
50.00	-.00170	-.03837	-.0616	.07511	.07657
60.00	.00589	-.02106	.2973	.09251	-.01767
70.00	.00378	-.01109	.0265	.08211	-.11804
80.00	-.00017	-.00787	.0167	.08780	-.14780
90.00	-.00170	-.00704	.0149	.08820	-.16684
100.00	-.00017	-.00787	.0167	.08780	-.14780
110.00	.00378	-.01109	.0265	.08211	-.11804
120.00	.00589	-.02106	.2973	.09251	-.01767
130.00	-.00170	-.03837	-.0616	.07511	.07657
134.00	-.00379	-.04155	-.0539	.07713	.09690
140.00	.00068	-.04103	-.0672	.08912	.09471
150.00	.01704	-.03458	-.1165	.09991	.06774
160.00	.03376	-.03266	-.6900	.33353	.03831
170.00	.04561	-.03085	.1533	-.04328	-.05126
180.00	.0	.0	.0	.0	.0

DR(h, β)

T = 20 sec STRIKE = 0° DIP = 90° SLIP - 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-2.2591	-.06083	.002248	.004394	.02932
20.00	-2.0036	-.06027	.003297	.006181	.02661
30.00	-1.2126	-.05845	.002532	.004033	.02051
40.00	- .3073	-.05085	-.017174	-.015659	.01022
44.00	- .1120	-.04039	-.039425	-.027573	.00728
50.00	- .3377	-.04957	-.002342	-.002599	.01057
60.00	-1.6385	-.04795	.032428	.094583	.02541
70.00	-1.9351	-.02633	.046145	.181735	.03089
80.00	-1.4660	.07367	.058907	.255328	.03199
90.00	- .0815	1.01349	.065675	.288873	.03211
100.00	-1.4660	.07367	.058907	.255328	.03199
110.00	-1.9351	-.02633	.046145	.181735	.03089
120.00	-1.6385	-.04795	.032428	.094583	.02541
130.00	- .3377	-.04957	-.002342	-.002599	.01057
134.00	- .1086	-.03998	-.037162	-.026595	.00717
140.00	- .3073	-.05085	-.017174	-.015659	.01022
150.00	-1.2126	-.05845	.002532	.004033	.02051
160.00	-2.0036	-.06027	.003297	.006181	.02661
170.00	-2.2591	-.06083	.002248	.004394	.02932
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.0975	-.05790	-.009257	-.007838	-.4082
20.00	-.1032	-.06372	-.008969	-.008012	-.5373
30.00	-.1404	-.09501	-.008667	-.009027	.9741
40.00	.2972	.27784	-.008591	-.012865	.1977
44.00	.0896	.10141	-.008569	-.014587	.1340
50.00	.3590	.33212	-.007740	-.011058	.1719
60.00	-.1001	-.06363	-.006361	-.004858	-.3547
70.00	-.0861	-.05156	-.005750	-.003241	-.1449
80.00	-.0828	-.04905	-.005418	-.002649	-.1129
90.00	-.0828	-.04895	-.005312	-.002498	-.1119
100.00	-.0828	-.04905	-.005418	-.002649	-.1129
110.00	-.0861	-.05156	-.005750	-.003241	-.1449
120.00	-.1001	-.06363	-.006361	-.004858	-.3547
130.00	.3590	.33212	-.007740	-.011058	.1719
134.00	.0861	.09843	-.008397	-.014400	.1398
140.00	.2972	.27784	-.008591	-.012865	.1977
150.00	-.1404	-.09501	-.008667	-.009027	.9741
160.00	-.1032	-.06372	-.008969	-.008012	-.5373
170.00	-.0975	-.05790	-.009257	-.007838	-.4082
180.00	.0	.0	.0	.0	.0

TABLE III—*Continued*

DR(h,β)

T = 40 sec STRIKE = 0° DIP = 90° SLIP = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-2.6321	-.04493	-.04220	-.03629	-.02188
20.00	-1.9842	-.04462	-.04220	-.03504	-.01871
30.00	-1.2874	-.04423	-.04528	-.03314	-.01377
40.00	- .3546	-.04307	-.07790	-.03406	-.00826
44.00	- .1147	-.04236	-.11333	-.03877	-.00666
50.00	- .4102	-.04225	-.05684	-.02987	-.00322
60.00	-2.5610	-.04068	-.00331	-.00411	.01024
70.00	-6.1954	-.03456	.02477	.04522	.02453
80.00	.1574	-.00256	.06022	.17678	.03664
90.00	- .0812	.82196	.09073	.39952	.04168
100.00	.1574	-.00256	.06022	.17678	.03664
110.00	-6.1954	-.03456	.02477	.04522	.02453
120.00	-2.5610	-.04068	-.00331	-.00411	.01024
130.00	- .4102	-.04225	-.05684	-.02987	-.00322
134.00	- .1144	-.04239	-.11131	-.03845	-.00591
140.00	- .3546	-.04307	-.07790	-.03406	-.00826
150.00	-1.2874	-.04423	-.04528	-.03314	-.01377
160.00	-1.9842	-.04462	-.04220	-.03504	-.01871
170.00	-2.6321	-.04493	-.04220	-.03629	-.02188
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.05783	.001706	-.001942	-.05887	-.06245
20.00	-.05078	.006647	-.008420	-.06590	-.07269
30.00	-.03670	.012988	-.028026	-.10486	-.11476
40.00	-.01964	.014801	.080908	.20738	.22030
44.00	-.01536	.014181	.038993	.09426	.09642
50.00	-.00891	.022542	.235278	.43751	.41349
60.00	.06652	.091824	-.048090	-.05663	-.07220
70.00	.38681	.277720	-.047927	-.04461	-.05774
80.00	3.16454	1.689635	-.051917	-.04302	-.05686
90.00	-19.07733	-9.273250	-.053346	-.04253	-.05556
100.00	3.16454	1.689635	-.051917	-.04302	-.05686
110.00	.38681	.277720	-.047927	-.04461	-.05774
120.00	.06652	.091824	-.048090	-.05663	-.07220
130.00	-.00891	.022542	.235278	.43751	.41349
134.00	-.01394	.015185	.041670	.09431	.09352
140.00	-.01964	.014801	.080908	.20738	.22030
150.00	-.03670	.012988	-.028026	-.10486	-.11476
160.00	-.05078	.006647	-.008420	-.06590	-.07269
170.00	-.05783	.001706	-.001942	-.05887	-.06245
180.00	.0	.0	.0	.0	.0

TABLE IV

DR(h,δ)

T = 12 Seconds λ = 0°

θ	∂J/∂h ∂J/∂δ Layer 1 to 2 for Source in Layer 1	∂J/∂h ∂J/∂δ Layer 1 to 2 for Source in Layer 2	∂J/∂h ∂J/∂δ Layer 2 to 3 for Source in Layer 2	∂J/∂h ∂J/∂δ Layer 2 to 3 for Source in Layer 3	∂J/∂h ∂J/∂δ Layer 3 to 4 for Source in Layer 3
10.00	14589.1200	2.7674	-1.0384	- 2.9176	- .4193
20.00	-486487.9236	4.8239	-1.8101	- 5.9563	- .8560
30.00	- 10542.1116	7.7863	-2.9217	-10.6092	- 1.5247
40.00	- 711.5536	11.8042	-4.4294	-25.4075	- 3.6514
44.00	- 28.2917	-57.3203	21.5089	2.2194	.3190
50.00	- 501.3786	16.3930	-6.1513	-83.5137	-12.0021
60.00	- 3252.0278	18.9374	-7.1061	-31.8388	- 4.5757
70.00	- 6521.5246	21.7255	-8.1523	-34.5805	- 4.9697
80.00	- 8968.6165	23.5805	-8.8484	-37.0468	- 5.3242
90.00	0	0	0	0	0
100.00	- 8968.6166	23.5805	-8.8484	-37.0468	- 5.3242
110.00	- 6521.5245	21.7255	-8.1523	-34.5805	- 4.9697
120.00	- 3252.0279	18.9374	-7.1061	-31.8388	- 4.5757
130.00	- 501.3785	16.3930	-6.1513	-83.5137	-12.0021
134.00	- 26.6139	-34.5384	12.9602	2.0627	.2964
140.00	- 711.5536	11.8042	-4.4294	-25.4075	- 3.6514
150.00	- 10542.1117	7.7863	-2.9217	-10.6092	- 1.5247
160.00	-486488.3973	4.8239	-1.8101	- 5.9563	- .8560
170.00	14589.1201	2.7674	-1.0384	- 2.9176	- .4193
180.00	0	0	0	0	0

θ	∂J/∂h ∂J/∂δ Layer 3 to 4 for Source in Layer 4	∂J/∂h ∂J/∂δ Layer 4 to 5 for Source in Layer 4	∂J/∂h ∂J/∂δ Layer 4 to 5 for Source in Layer 5	∂J/∂h ∂J/∂δ Layer 5 to 6 for Source in Layer 5	∂J/∂h ∂J/∂δ Layer 5 to 6 for Source in Layer 6
10.00	- .6797	.0249	.0248	- .0158	-.0170
20.00	- 1.6082	.0589	.0588	- .0376	-.0419
30.00	- 3.0921	.1133	.1143	- .0731	-.0816
40.00	-15.6617	.5737	2.3444	-1.4990	-.3679
44.00	.3430	-.0126	-.0100	.0064	.0093
50.00	16.7034	-.6118	-.2852	.1823	.5539
60.00	-11.3750	.4167	.4772	- .3051	-.2975
70.00	-11.4750	.4203	.4492	- .2872	-.3037
80.00	-12.0826	.4426	.4656	- .2977	-.3207
90.00	0	0	0	0	0
100.00	-12.0826	.4426	.4656	- .2977	-.3207
110.00	-11.4750	.4203	.4492	- .2872	-.3037
120.00	-11.3750	.4167	.4772	- .3051	-.2975
130.00	16.7034	-.6118	-.2852	.1823	.5539
134.00	.3218	-.0118	-.0094	.0060	.0087
140.00	-15.6617	.5737	2.3444	-1.4990	-.3679
150.00	- 3.0921	.1133	.1143	- .0731	-.0816
160.00	- 1.6082	.0589	.0588	- .0376	-.0419
170.00	- .6797	.0249	.0248	- .0158	-.0170
180.00	0	0	0	0	0

TABLE IV—*Continued*

DR(h,δ)

T = 12 Seconds λ = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ Source in Layer 3
10.00	17.2177	- .1360	.0560	- 3.2890	- .2474
20.00	73.3978	- .7091	.2916	10.2811	.7274
30.00	-26.4127	- .9781	.3841	2.6445	.1641
40.00	- 3.9267	- .5567	.0721	.2818	.0074
44.00	- 1.8361	- .2827	- .1955	- .7093	- .0430
50.00	1.9555	2.7186	- .7521	-15.8527	.5601
60.00	.9271	2.3682	-2.9008	- 3.8755	- .0676
70.00	- .6474	-10.7102	-14.2720	- 6.9867	- .0621
80.00	- 1.9708	138.1522	25.5577	-16.8289	.0054
90.00	- 2.1904	419.3027	9.5734	87.2187	- .3492
100.00	.3829	32.8730	6.0814	12.3435	- .0040
110.00	.1744	2.9510	3.9325	6.1700	.0548
120.00	- .4080	- 1.6930	2.0737	3.4003	.0593
130.00	- .6595	- 1.0277	.2843	.8610	- .0304
134.00	- .5191	- .6548	- .5125	-185.6569	-13.2884
140.00	4.6950	1.2565	- .1628	- .3099	- .0082
150.00	16.5548	2.2071	- .8667	- 1.8221	- .1131
160.00	-65.6186	2.5470	-1.0475	- 2.3548	- .1666
170.00	-11.1622	2.0672	- .8513	- 1.7192	- .1293
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	- .2379	.1688	.1726	- .0440	- .0467
20.00	6.8817	-6.7287	-3.0352	1.4599	1.0565
30.00	.2525	- .5174	- .4969	.4311	.4040
40.00	.0098	- .5354	- .5352	.7049	.6450
44.00	- .0567	- .7445	- .7274	1.0282	.9745
50.00	.1621	3.6437	-957.6124	1179.0552	-2.5558
60.00	- .0617	.2109	.2385	.0804	.0618
70.00	- .0513	.1500	.1609	.4831	.3991
80.00	.0038	.2267	.2455	1.2414	1.0135
90.00	8.4032	37.0932	-4.9960	-28.7174	427.9968
100.00	- .0038	- .2246	- .2204	- 1.1146	- .9906
110.00	.0494	- .1444	- .1469	- .4410	- .3790
120.00	.0545	- .1862	- .1987	- .0670	- .0544
130.00	- .0294	- .6608	- .9114	1.1221	.6243
134.00	-1.5160	-16.8721	3.5790	- 5.0351	4.0182
140.00	- .0092	.5051	.4730	- .6231	- .6604
150.00	- .1345	.2757	.2655	- .2303	- .2364
160.00	- .2105	.2058	.1970	- .0948	- .1008
170.00	- .1568	.1113	.1076	- .0275	- .0291
180.00	0	0	0	0	0

TABLE IV—*Continued*

DR(h,δ)

T = 20 Seconds   λ = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	2733.2571	10.4671	399.4511	1.0754	- .8882
20.00	18385.0593	36.5017	1392.9949	1.1000	- .9085
30.00	-6065.7369	78.5989	2999.5249	1.1242	- .9285
40.00	- 351.9419	444.0968	16947.8129	1.1504	- .9502
44.00	- 12.9458	- 6.7414	- 257.2682	1.2512	-1.0334
50.00	- 246.8953	-395.1418	-15079.5700	1.1734	- .9691
60.00	-1627.4623	315.4869	12039.7443	1.1847	- .9785
70.00	-3299.4888	318.8119	12166.6357	1.1968	- .9885
80.00	-4567.5540	336.4264	12838.8478	1.2045	- .9948
90.00	0	0	0	0	0
100.00	-4567.5537	336.4264	12838.8478	1.2045	- .9948
110.00	-3299.4888	318.8119	12166.6358	1.1968	- .9885
120.00	-1627.4623	315.4869	12039.7445	1.1847	- .9785
130.00	- 246.8953	-395.1418	-15079.5693	1.1734	- .9691
134.00	- 12.1299	- 6.2776	- 239.5702	1.2658	-1.0455
140.00	- 351.9419	444.0968	16947.8123	1.1504	- .9502
150.00	-6065.7369	78.5989	2999.5249	1.1242	- .9285
160.00	18385.0655	36.5017	1392.9949	1.1000	- .9085
170.00	2733.2571	10.4671	399.4511	1.0754	- .8882
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	- 30.4772	- .5336	- .8697	- .5927	- .9602
20.00	- 49.9811	- .8751	-1.6013	-1.0911	-2.0248
30.00	- 78.1996	-1.3692	-2.7013	-1.8407	-3.6616
40.00	-142.7543	-2.4995	-6.0463	-4.1201	-8.8680
44.00	29.3076	.5131	.6381	.4348	.7490
50.00	- 26.1585	-4.5551	-16.7154	-11.3903	-29.8890
60.00	-194.9684	-3.4137	-7.6240	-5.1952	-11.1467
70.00	-215.4981	-3.7731	-8.2890	-5.6483	-12.1139
80.00	-231.2344	-4.0487	-8.8720	-6.0456	-12.9838
90.00	0	0	0	0	0
100.00	-231.2344	-4.0487	-8.8720	-6.0456	-12.9838
110.00	-215.4981	-3.7731	-8.2890	-5.6483	-12.1139
120.00	-194.9684	-3.4137	-7.6240	-5.1952	-11.1467
130.00	-260.1585	-4.5551	-16.7154	-11.3903	-29.8890
134.00	26.8403	.4699	.5919	.4033	.6962
140.00	-142.7543	-2.4995	-6.0463	-4.1201	-8.8680
150.00	- 78.1996	-1.3692	-2.7013	-1.8407	-3.6616
160.00	- 49.9811	- .8751	-1.6013	-1.0911	-2.0248
170.00	- 30.4772	- .5336	- .8697	- .5927	- .9602
180.00	0	0	0	0	0

DR(h,δ)

T = 20 Seconds λ = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	9.3882	-3.4044	.1277	.2036	1.3369
20.00	34.5391	-3.8550	.2114	.0731	.3142
30.00	-21.1372	-2.8247	.1219	.0564	.2879
40.00	- 3.4828	-1.2068	- .4071	- .3092	.2020
44.00	- 2.2716	- .8832	- .8632	- .7353	.1937
50.00	2.3294	1.7906	.0832	- .1996	.8231
60.00	1.9153	1.8631	-1.2593	-9.5150	-2.5572
70.00	.8158	1.4159	-2.4816	-39.9150	-6.7848
80.00	- .9960	-5.7816	-4.6253	163.5769	20.4946
90.00	- 2.0240	-891.3881	-57.7599	46.8524	5.2138
100.00	.2359	5.2848	4.2278	24.6768	3.0918
110.00	- .2066	-1.1090	1.9437	12.0225	2.0436
120.00	- .8204	-1.4698	.9934	4.8556	1.3050
130.00	- .8513	- .8843	- .0411	- .3055	1.2602
134.00	- .8472	- .8051	- .7492	5.2207	-1.4052
140.00	3.6793	1.6249	.5481	.5542	- .3622
150.00	13.4610	2.8570	- .1233	- .0929	- .4744
160.00	-25.0354	4.0598	- .2226	- .1189	- .5113
170.00	- 5.4227	3.3390	- .1253	- .0614	- .4032
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	-2.1640	-1.2797	-1.5264	-1.3017	-1.2467
20.00	1.3155	.8073	1.1514	1.0356	1.8141
30.00	.7317	.4955	.6617	.6894	.9626
40.00	.3975	.3717	.4765	.7110	.8984
44.00	.3635	.4123	.5273	.9016	1.1716
50.00	1.7582	1.6288	2.4040	3.4504	-20.8513
60.00	-2.1213	-1.3526	-1.4146	-1.0692	- .8084
70.00	-3.6055	-2.1577	-2.1747	-1.2207	- .9527
80.00	-13.0675	-7.7320	-6.6410	-3.2600	-2.0422
90.00	10.4930	6.1983	7.7643	3.6528	5.9191
100.00	3.8766	2.2938	2.5254	1.2397	1.2545
110.00	2.2832	1.3664	1.4747	.8278	.7778
120.00	1.4807	.9442	1.0204	.7712	.6814
130.00	1.7826	1.6515	1.6850	2.4184	1.3875
134.00	-1.5332	-1.7585	-2.4008	-4.1159	14.4884
140.00	- .5020	- .4694	- .5730	- .8551	-1.0798
150.00	- .7046	- .4772	- .5928	- .6176	- .7701
160.00	- .7931	- .4867	- .6186	- .5564	- .7223
170.00	- .5990	- .3542	- .4457	- .3801	- .4820
180.00	0	0	0	0	0

DR(h,δ)

T = 40 Seconds λ = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	1716.7772	45.7247	62.0835	2.3983	5.0076
20.00	9784.7640	178.9135	242.9230	7.7860	16.2570
30.00	-5536.8907	473.5531	642.9752	16.9845	35.4630
40.00	- 293.6014	- 165.0005	- 224.0324	-62.6176	-130.7435
44.00	- 10.2829	- 4.7293	- 6.4213	- .7996	- 1.6694
50.00	- 205.4875	- 102.4471	- 139.0994	-19.9476	- 41.6500
60.00	-1366.2445	- 1262.7014	- 1714.4554	107.0624	223.5429
70.00	-2786.3273	-11470.1806	-15573.8428	82.1997	171.6303
80.00	-3871.1413	13670.9366	18561.9586	82.0518	171.3214
90.00	0	0	0	0	0
100.00	-3871.1403	13670.9365	18561.9585	82.0518	171.3214
110.00	-2786.3263	-11470.1909	-15573.8568	82.1997	171.6303
120.00	-1366.2443	- 1262.7013	- 1714.4552	107.0624	223.5429
130.00	- 205.4875	- 102.4471	- 139.0994	-19.9476	- 41.6500
134.00	- 9.6060	- 4.4196	- 6.0008	- .7514	- 1.5688
140.00	- 293.6014	- 165.0005	- 224.0324	-62.6176	-130.7435
150.00	-5536.8907	473.5531	642.9752	16.9845	35.4630
160.00	9784.7640	178.9135	242.9230	7.7860	16.2570
170.00	1716.7774	45.7247	62.0835	2.3983	5.0076
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	.9021	3.6106	.8496	1.5688	.6880
20.00	1.9072	7.6335	1.1034	2.0374	.7654
30.00	3.4400	13.7685	1.4275	2.6358	.8512
40.00	7.2840	29.1539	1.8655	3.4446	.9484
44.00	- .9177	- 3.6729	-70.6474	-130.4457	1.2953
50.00	16.3731	65.5330	2.3460	4.3317	1.0431
60.00	10.0901	40.3855	2.5599	4.7267	1.1057
70.00	11.1768	44.7351	2.8312	5.2275	1.1648
80.00	12.0406	48.1924	3.0125	5.5623	1.2031
90.00	0	0	0	0	0
100.00	12.0406	48.1924	3.0125	5.5623	1.2031
110.00	11.1768	44.7351	2.8312	5.2275	1.1648
120.00	10.0901	40.3855	2.5599	4.7267	1.1057
130.00	16.3731	65.5330	2.3460	4.3317	1.0431
134.00	- .8477	- 3.3928	-13.1901	-24.3546	1.3690
140.00	7.2840	29.1539	1.8655	3.4446	.9484
150.00	3.4400	13.7685	1.4275	2.6358	.8512
160.00	1.9072	7.6335	1.1034	2.0374	.7654
170.00	.9021	3.6106	.8496	1.5688	.6880
180.00	0	0	0	0	0

TABLE IV—*Continued*

DR(h,δ)

T = 40 Seconds   λ = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	2.6122	3.1439	2.9614	- .5792	- .3472
20.00	8.2886	25.7988	24.4096	- .8342	- .4455
30.00	-8.3177	- 4.0892	- 4.1818	- .8317	- .3459
40.00	-1.2442	- .9397	- 1.6993	- .9091	- .2208
44.00	- .8780	- .7478	- 2.0003	- 1.4552	- .2508
50.00	.8194	.7317	.9840	3.5321	.3850
60.00	.9150	.7877	.0649	.1228	- .3026
70.00	.7706	.7157	- .5125	- 1.8726	-1.0160
80.00	.0395	.0472	- 1.0748	-14.9357	-3.0937
90.00	-1.7232	-14.6484	- 1.6131	100.9842	10.5388
100.00	- .0096	- .0323	.7360	8.6653	1.7948
110.00	- .1757	- .2739	.1961	1.3595	.7376
120.00	- .3756	- .3864	- .0318	- .0956	.2356
130.00	- .3343	- .3071	- .4130	- .8964	- .0977
134.00	- .3728	- .3494	- .9149	- 3.2319	- .4969
140.00	1.0683	.9309	1.6832	1.3268	.3222
150.00	5.2464	2.7758	2.8386	.9626	.4004
160.00	-5.3834	-34.8188	-32.9440	1.0650	.5688
170.00	-1.3345	- 2.5001	- 2.3550	.8216	.4925
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	- .0197	.0005	.0020	.0656	.3545
20.00	- .1121	.0147	.0123	.0963	.1955
30.00	- .1368	.0487	.0434	.1614	.2366
40.00	- .1210	.0913	.0874	.2238	.2889
44.00	- .1410	.1303	.1274	.3061	.3927
50.00	- .3661	.9193	.8472	1.5733	9.6561
60.00	- .7949	-1.0977	-1.4123	-1.6596	-1.2495
70.00	-6.3518	-4.5519	-7.9975	-7.4573	-3.6682
80.00	15.2153	8.1458	7.6972	6.3591	22.0710
90.00	6.1899	3.0140	3.6346	2.8887	3.8787
100.00	3.4189	1.8304	2.3073	1.9062	2.1872
110.00	1.5475	1.1090	1.3846	1.2911	1.3788
120.00	.4322	.5968	.7148	.8400	.8562
130.00	- .1708	.4290	.4822	.8955	.7914
134.00	-3.3147	3.5998	4.3072	9.8033	2.6910
140.00	.2475	- .1867	- .1921	- .4916	- .5739
150.00	.2758	- .0981	- .0969	- .3605	- .4174
160.00	.3335	- .0437	- .0415	- .3244	- .3762
170.00	.2839	- .0078	- .0073	- .2395	- .2718
180.00	0	0	0	0	0

TABLE V

DR(h,λ)

T = 12 Seconds δ = 90°

θ	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 3
10.00	1275.9627	-12.6025	4.7290	14.5351	2.0889
20.00	933.1501	-12.3178	4.6221	14.4292	2.0737
30.00	474.7773	-11.9447	4.4822	15.0362	2.1609
40.00	86.2402	-12.6551	4.7487	55.1954	7.9324
44.00	9.8354	41.4490	-15.5534	-2.6023	- .3740
50.00	116.6688	-11.0949	4.1633	19.3920	2.7870
60.00	1501.8526	- 9.5157	3.5707	9.3594	1.3451
70.00	68803.7575	- 8.7202	3.2722	8.0929	1.1631
80.00	-2104.7251	- 8.0097	3.0056	7.1809	1.0320
90.00	0	0	0	0	0
100.00	-2104.7246	- 8.0097	3.0056	7.1809	1.0320
110.00	68804.0735	- 8.7202	3.2722	8.0929	1.1631
120.00	1501.8528	- 9.5157	3.5707	9.3594	1.3451
130.00	116.6688	-11.0949	4.1633	19.3929	2.7870
134.00	10.2562	70.3324	-26.3916	-2.8505	- .4097
140.00	86.2402	-12.6551	4.7487	55.1954	7.9324
150.00	474.7773	-11.9447	4.4822	15.0362	2.1609
160.00	933.1501	-12.3178	4.6221	14.4292	2.0737
170.00	1275.9627	-12.6025	4.7290	14.5351	2.0889
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 6
10.00	3.6575	-.1340	-.1420	.0908	.0904
20.00	3.6759	-.1346	-.1454	.0929	.0902
30.00	4.1075	-.1505	-.1756	.1123	.0988
40.00	-8.6560	.3171	.1553	-.0993	-.2586
44.00	- .3361	.0123	.0102	-.0065	-.0083
50.00	9.1398	-.3348	-1.4244	.9107	.1933
60.00	1.9854	-.0727	- .0736	.0470	.0478
70.00	1.6205	-.0594	- .0591	.0378	.0387
80.00	1.3802	-.0506	- .0502	.0321	.0326
90.00	0	0	0	0	0
100.00	1.3802	-.0506	- .0502	.0321	.0326
110.00	1.6205	-.0594	- .0591	.0378	.0387
120.00	1.9854	-.0727	- .0736	.0470	.0478
130.00	9.1398	-.3348	-1.4244	.9107	.1933
134.00	- .3638	.0133	.0110	-.0071	-.0090
140.00	-8.6560	.3171	.1553	-.0993	-.2586
150.00	4.1075	-.1505	- .1756	.1123	.0988
160.00	3.6759	-.1346	- .1454	.0929	.0902
170.00	3.6575	-.1340	- .1420	.0908	.0904
180.00	0	0	0	0	0

TABLE V—*Continued*

DR(h,λ)

T = 20 Seconds   δ = 90°

θ	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 3
10.00	644.2503	-54.8378	-2092.7418	-4.8497	4.0055
20.00	466.6341	-52.7728	-2013.9379	-4.8475	4.0037
30.00	232.3539	-54.0168	-2061.4138	-4.8491	4.0050
40.00	38.4799	76.7256	2928.0350	-4.9114	4.0564
44.00	3.5486	2.2616	86.3079	-5.5216	4.5604
50.00	53.3796	-90.6998	-3461.3253	-4.8624	4.0160
60.00	857.6700	-17.4598	- 666.3088	-4.7897	3.9559
70.00	-2598.4890	-11.0740	- 422.6120	-4.7682	3.9382
80.00	- 395.6496	- 6.9018	- 263.3899	-4.7491	3.9224
90.00	0	0	0	0	0
100.00	- 395.6495	- 6.9018	- 263.3899	-4.7491	3.9224
110.00	-2598.4868	-11.0740	- 422.6120	-4.7682	3.9382
120.00	857.6702	-17.4598	- 666.3088	-4.7897	3.9559
130.00	53.3796	-90.6998	-3461.3253	-4.8624	4.0160
134.00	3.7125	2.4128	92.0783	-5.4604	4.5099
140.00	38.4799	76.7256	2928.0350	-4.9114	4.0564
150.00	232.3539	-54.0168	-2061.4138	-4.8491	4.0050
160.00	466.6341	-52.7728	-2013.9379	-4.8475	4.0037
170.00	644.2504	-54.8378	-2092.7418	-4.8497	4.0055
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 6
10.00	147.3938	2.5807	4.3311	2.9513	4.7770
20.00	146.9187	2.5724	4.3249	2.9471	4.7308
30.00	151.4278	2.6513	4.5422	3.0952	4.9084
40.00	278.7405	4.8805	14.1075	9.6132	18.2860
44.00	- 49.2925	- .8631	- .9091	- .6195	- .8230
50.00	176.9778	3.0987	5.8884	4.0125	6.2642
60.00	111.0030	1.9435	2.9902	2.0376	3.0065
70.00	100.8038	1.7650	2.6392	1.7984	2.5820
80.00	93.3080	1.6337	2.3915	1.6296	2.2741
90.00	0	0	0	0	0
100.00	93.3080	1.6337	2.3915	1.6296	2.2741
110.00	100.8038	1.7650	2.6392	1.7984	2.5820
120.00	111.0030	1.9435	2.9902	2.0376	3.0065
130.00	176.9778	3.0987	5.8884	4.0125	6.2642
134.00	- 54.8557	- .9605	- .9989	- .6807	- .9008
140.00	278.7405	4.8805	14.1075	9.6132	18.2860
150.00	151.4278	2.6513	4.5422	3.0952	4.9084
160.00	146.9187	2.5724	4.3249	2.9471	4.7308
170.00	147.3938	2.5807	4.3311	2.9513	4.7770
180.00	0	0	0	0	0

DR(h,λ)

T = 40 Seconds   δ = 90°

θ	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 3
10.00	543.1106	-1946.5281	-2642.9334	-15.0710	-31.4678
20.00	391.2632	1637.7327	2223.6609	-15.5345	-32.4355
30.00	192.4640	181.7297	246.7467	-21.6188	-45.1393
40.00	29.9003	15.6294	21.2211	5.2478	10.9571
44.00	2.0710	1.1256	1.5283	.4289	.8955
50.00	42.2716	24.9539	33.8816	17.3521	36.2307
60.00	777.6790	- 69.9839	- 95.0218	- 4.8697	-10.1678
70.00	-1374.7909	- 27.8354	- 37.7940	- 3.2671	- 6.8216
80.00	- 243.7620	- 9.0527	- 12.2915	- 2.3026	- 4.8077
90.00	0	0	0	0	0
100.00	- 243.7618	- 9.0527	- 12.2915	- 2.3026	- 4.8077
110.00	-1374.7885	- 27.8354	- 37.7940	- 3.2671	- 6.8216
120.00	777.6797	- 69.9839	- 95.0218	- 4.8697	-10.1678
130.00	42.2716	24.9539	33.8816	17.3521	36.2307
134.00	2.1801	1.1838	1.6073	.4565	.9532
140.00	29.9003	15.6294	21.2211	5.2478	10.9571
150.00	192.4640	181.7297	246.7467	-21.6188	-45.1393
160.00	391.2632	1637.7327	2223.6609	-15.5345	-32.4355
170.00	543.1107	-1946.5269	-2642.9318	-15.0710	-31.4678
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5' ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 6
10.00	-4.3751	-17.5114	-3.8854	-7.1741	-3.1114
20.00	-4.3017	-17.2174	-3.8576	-7.1228	-3.1008
30.00	-4.3511	-17.4153	-3.8448	-7.0991	-3.0919
40.00	-9.5318	-38.1509	-4.2798	-7.9024	-3.1899
44.00	.9460	3.7863	34.2394	63.2208	-4.9420
50.00	-4.9423	-19.7813	-3.8760	-7.1567	-3.0849
60.00	-2.7944	-11.1847	-3.4053	-6.2877	-2.9479
70.00	-2.4159	- 9.6696	-3.2598	-6.0190	-2.8950
80.00	-2.1284	- 8.5190	-3.1320	-5.7830	-2.8453
90.00	0	0	0	0	0
100.00	-2.1284	- 8.5190	-3.1320	-5.7830	-2.8453
110.00	-2.4159	- 9.6696	-3.2598	-6.0190	-2.8950
120.00	-2.7944	-11.1847	-3.4053	-6.2877	-2.9479
130.00	-4.9423	-19.7813	-3.8760	-7.1567	-3.0849
134.00	1.0416	4.1691	186.0357	343.5027	-4.7025
140.00	-9.5318	-38.1509	-4.2798	-7.9024	-3.1899
150.00	-4.3511	-17.4153	-3.8448	-7.0991	-3.0919
160.00	-4.3017	-17.2174	-3.8576	-7.1228	-3.1008
170.00	-4.3751	-17.5114	-3.8854	-7.1741	-3.1114
180.00	0	0	0	0	0

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